



# ***AIR POWER***

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## **AIR POWER**

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## EDITOR'S NOTE

It had to be so in the fitness of things that the Air Chief Marshal P.C. Lal Memorial Lecture would be delivered by a person of similar intellectual calibre and national standing to share his views on national security, its challenges and our interests. We are privileged to publish the PC Lal Memorial Lecture delivered by Shri Shivshankar Menon, the National Security Adviser to the present government and are confident that our readers would greatly benefit from it.

When we visualise the issues that Menon has raised, the first thing that strikes one is: are we as a nation, preparing ourselves for what India's destiny now holds out as an imminent prospect of its rise as a major power? Or are we going to continue to quibble over lesser things and merely loom inwards while making various communities into a model of exclusivity? When and where did we start to forget the values for the nation spelt out in the Preamble of our Constitution? The global picture is clear now: the major powers of the world *de-facto* are engaged in a triangle — consisting of the United States, China and India — with many developed and powerful states like Russia, Japan and Germany not far behind, as a consequence of the tectonic changes triggered by economic and political factors of the past two decades that have affected the world. The world had accepted the United States as the sole superpower long ago and perhaps accorded it status and privileges even beyond its capabilities. But it has long ago stitched together a military and economic alliance with almost all the developed industrialised countries of the

world and this factor raises the global power balance in its favour.

China is a new entrant to the major power group. Its rapid progress toward a goal well understood by all sections of the nation and its society has been a major factor in this process. The existence of an all pervasive single political (Communist) party is a major factor in mobilising the nation along the vector of rapid growth without facing unmanageable turbulence. Unfortunately, we are not drawing the right and relevant lessons from China as we are inevitably placed in a situation of competition and potential rivalry. It is fortunate that studies on China have picked up during the past decade or so, especially when we look back and find a total absence of such studies when China in the 1980s was systematically setting itself on the path of growth. What still needs to be done is to ensure that these studies are as objective as we can make them. Only then, would we be able to serve our national security interests in the time and space required.

# INDIA'S NATIONAL SECURITY: CHALLENGES AND ISSUES

(P.C. Lal Memorial Lecture, April 2, 2012,  
organised by the Air Force Association)

**SHIVSHANKAR MENON**

Marshal of the Air Force Arjan Singh,  
Chief Marshal P.V. Naik, President, Air Force Association,  
Air Chief Marshal N.A.K. Browne, Chief of the Air Staff,

Ladies and Gentlemen,

I am deeply honoured to be asked to deliver the P.C. Lal memorial lecture this year. The topic selected is a very wide one, as it should be for a lecture in memory of someone like Air Chief Marshal (ACM) Lal. His contributions to the nation were wide-ranging and manifold, ranging from national security to Indian air power and doctrine to defence industry to civil aviation and to allied subjects. After his education in St. Stephens College and King's College, London, he had a distinguished war record in World War II, displayed his command of air strategy in the 1965 and 1971 Wars, and made major contributions to building up Hindustan Aeronautics Limited (HAL) as Managing Director (MD), and to civil aviation as Chairman and MD of Air India and Indian Airlines simultaneously.

His autobiography and his seminal 1975 USI National Security lecture on "Some Problems in Defence" are well worth reading even today.

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Shri **Shivshankar Menon** is the National Security Adviser, Government of India.

**“Clear political direction, intelligent cooperation between the civil and the military authorities and close collaboration among the three Services” were what was needed.**

They remind us of his eminent good sense, his strategic vision and his systems approach, optimising available resources. Dipping into ACM Lal’s autobiography, one is reminded of the importance of thinking for ourselves, given the uniqueness of India’s situation. In the 1965 and 1971 Wars, we saw the results of his systems approach, of making the best of what we had, with brilliant results for the Indian Air Force. But you know this better than I do.

Air Chief Mshl Lal’s USI National Security lecture spoke of “responsible planning”, of “thinking purple” or jointness, of military officers in the Ministry of Defence, and of the proposal for a Chief of Defence Staff, which Gen Chaudhury had raised before him. It is worth reminding ourselves today of what Air Chief Mshl Lal advocated. He said, “Clear political direction, intelligent cooperation between the civil and the military authorities and close collaboration among the three Services” were what was needed. He never made Trenchard’s claim of “substitution” between one Service and another or between civil and military. Instead, he was an advocate of all three Services, and the civil and military authorities, working together in the most productive way, and he lived his life by his principles.

He was truly a leader who lived a full and integrated life, whose work and writings are still relevant and bear repeating.

Ladies and Gentlemen,

A few days ago a young colleague of mine sent me an article by K.M. Panikkar, from the journal *International Affairs* of January 1946, about the defence and security of India. He distinguished between the defence of India (i.e., its internal organisation, the structure and maintenance of our armed forces, and so on) and the security of India. Panikkar said, “The Indian security sphere covers the entire Indian Ocean area. India’s interest in the security of the Persian Gulf, the integrity and stability of the Persian Gulf and Afghanistan, the neutralisation of Sinkiang and Tibet

and the security of Burma, Siam and the Indo-Chinese coastline, apart, of course, from Malaysia and Singapore, is obvious enough to all". Panikkar believed and argued that for its security, India must become the pivot of an organisation meant to preserve peace in this large area, with the primary security responsibilities remaining with Britain, and with defence as India's responsibility. It was his view that that India's defence should be based on a "ring-fence concept". What Panikkar said about the ring-fence was really no different in substance from what Hastings, Dalhousie and Curzon had said before him, and he admitted as much with some pride.

Very soon after Panikkar wrote the article, developments in India, (partition and independence), the founding of the People's Republic of China, the Cold War, the state of the post-War world economy, and several other factors made his ideas and plans academic, influenced as they clearly were by the colonial after-effect on Indian minds. Fortunately for India, we had in Nehru someone who saw things much more clearly. He chose and persuaded India to follow a strategy of non-alignment instead. The happy results of that choice are evident in the degree of strategic autonomy that India now enjoys.

Re-reading the 1946 article I was struck by how today we still hear echoes of a similar mindset, and by what an inaccurate prediction and solution it offered to the national security challenges that the Indian republic actually faced in its sixty plus years. One can think of many reasons for this. In the last sixty years, Indian capacities have been transformed, the world around us has changed radically, technology has developed at an unprecedented pace, and there have been at least two revolutions in military affairs.

But the most important change, to my mind, has been in how we define India's interests, how that definition has grown, and in our ability to begin to think for ourselves and to strive for strategic autonomy. To a very great extent, we owe the basis for this to Nehru and his generation of leaders, but each subsequent generation, from every party, has contributed to this process. Our definition of security has gradually expanded over time from the defence of our territory to include providing the necessities for our existence and growth such as energy and water, and to larger issues of global and regional security. We now speak of traditional and non-traditional

**One other way in which Panikkar's 1946 article was inaccurate in its view of our national security was the way it underestimated the air and maritime imperatives that face us today, and the increasing role of air.**

security and even of human security, as if there were any other kind.

One other way in which Panikkar's 1946 article was inaccurate in its view of our national security was the way it underestimated the air and maritime imperatives that face us today, and the increasing role of air and technology in our national security calculus. (In saying so, I take outer space and our use of it as a natural extension of our reach into the air.)

So how should one think about the national security of a country like India, a subcontinent, with a unique geography, with plurality in every respect, which faces 21<sup>st</sup> century challenges in cyber space and primeval tribal insurgencies at the same time?

Let me state my bias or assumption at the outset.

Hard security, or external defence and internal security as traditionally defined, are core and are essential conditions for India to be able to transform itself and seek prosperity and opportunity for its citizens. This is true no matter how new challenges and technology may have changed the tests that face us. We must not confuse purpose (such as welfare) with means (such as law and order) or the situation. Take, for instance, energy security. That is a goal, and, like absolute security, is probably an unattainable one in absolute terms or in isolation from others. Among the means to reach that goal are security of energy sources, of sea lanes of communication, and so on, and they require hard power instruments and the willingness to use them.

Let us now consider the sort of national security challenges that India faces today. (I do so in the certain knowledge that fifty years from now, someone will read this and say how wrong we were in anticipating the real challenges of the next fifty years.)

My starting point is that thanks to what our predecessors like P.C. Lal achieved, India today does not face an existential threat. But it does face several internal and external threats and challenges that could prevent us

from realising our potential and our goal of building a strong and prosperous nation where each citizen has the opportunity to fulfil his potential.

## **MAIN CHALLENGES**

Even with an expanded definition of national security, I would suggest that today our national security challenges are in five main areas.

### *Internal Security*

National security begins at home, even as today the distinction between internal and external challenges is increasingly blurred.

For a nation undergoing social and economic change at a rate unparalleled in its long history, and where aspirations are rising exponentially, India as a society is remarkably at peace with itself. It is hard to think of other societies at comparable stages of development with such low levels of violence. It may not seem so in the face of the daily drumbeat of sensational and horrific stories in the media. But the facts bear this out.

Let us look at the facts.

Communal violence is lower in the last five years than before.

Left Wing Extremism (LWE) took fewer lives in 2011 than in 2010.

Insurgencies in the northeast have taken their lowest toll in the last two decades in the last five years.

And Jammu & Kashmir (J&K) had a relatively peaceful year in 2011. The record turnout in the Panchayat polls shows the overwhelming desire of the people of J&K to lead normal fulfilling lives and be in democratic control of their own futures.

But these figures hide two major challenges.

Some of our instruments of internal security are in disrepair. China spends more on internal security (US\$ 111 billion in the last budget) than she does on external defence (US\$ 106 billion) by the official count. We spend less than one-third of our defence budget on internal security. And that too is far less than comparable states with our diversity and geographical spread spend on internal security and policing.

Add to this our reliance on 19<sup>th</sup> century laws and police structures

**The threats that we face are much more potent than those that our structures were designed to cope with. Look at the firepower that the Mumbai attackers brought with them.**

inherited from a colonial power. Some progress has been made in our attempts to reform and modernise them; other efforts are thwarted by the bogey of freedom or federalism in danger or on other grounds of local expediency.

Secondly, the threats that we face are much more potent than those that our structures were designed to cope with. Look at the firepower that the Mumbai attackers brought with them. And think of what state sponsored terrorists could have access to, up to, and including, weapons of mass destruction such as chemical, biological and radiological weapons.

Counter-terrorism is one area where we have made considerable progress since the Mumbai attack, establishing and strengthening our intelligence capabilities with the MACs and NATGRID, amending the Unlawful Activities (Prevention) Act (UAPA), establishing and empowering the National Investigation Agency (NIA), and undertaking the modernisation of police forces by assisting the state governments. But when it comes to giving practical effect to the amendments to the UAPA to be able to counter terrorism, we are still to achieve clarity on the establishment of the National Counter-Terrorism Centre (NCTC). I would only hope that a reasoned and informed debate will enable us to move forward to take the practical steps that are necessary.

### *A Peaceful Periphery*

There is no question that we need both a peaceful periphery and a supportive external environment if we are to transform India. For most of independent India's existence, both have been in short supply. But, in the last two decades or so, we have seen an improvement in both situations, with the situation in our neighbourhood stabilising and improving, and the global economic and geo-political situation conducive to our rapid economic change.

South Asia and the Indian Ocean region are our home and immediate neighbourhood. We have a stake in the peace, stability and prosperity of our neighbours, whether across the waters or on our land borders.

But by stating this, we raise the issue of how active we should be in bringing about the desirable outcome of a peaceful periphery. Do we hope that it will come about on its own? Or do we actively work with our neighbours who share our approach? We certainly should not interfere in others' internal affairs, even in the name of spreading peace or enforcing peace. But to what extent do we respond to requests for security assistance and commitments? These lines are not self-evident in the face of events on the ground. Can or should India be a net provider of security in the region and, if so, to what extent? India's role as a regional security provider would not be a new role, historically speaking. These are serious questions, even if my manner of posing them is not subtle enough to frame the issue properly, and I think that it is time that we debated them for ourselves.

When we look around our periphery today, we witness historic shifts and changes of unprecedented magnitude. West Asia, which is home to 6 million Indians and is critical to our security in so many ways, is in turmoil. The rise of radical and extremist elements, the prospects of proliferation of nuclear weapons, and the effects of the turmoil on energy security and markets make the rapidly changing situation in West Asia and North Africa a security concern for us and other powers.

While intent is the stuff of diplomacy, the national security calculus must include, and prepare to deal with, the capabilities we see around us. Today, the larger region in which we are situated is also that part of the world where the balance of power is shifting most rapidly. In Asia, there are several rising and established powers in a crowded geo-political space. Asia is in the midst of one of the most impressive arms races in history though, in the Asian manner, we are too polite to say so in public. Some calculations suggest that for the first time in several centuries, Asia's spending on defence is poised to overtake Europe's. Whether this is modernisation or a strategic arms race is a matter for professional debate. But the net effect is to pose new issues for our conventional defence.

### *The Defence of India*

The third national security challenge is, therefore, our conventional security,

**In the century of aircraft as an instrument of war, the capabilities of air power have grown exponentially.**

or the defence of India.

Apart from the complex situation that surrounds us, there are also rapid changes in the very nature of warfare.

Last year marked the centenary of the first use of an aircraft as an instrument of warfare. After one hundred years, Italian pilots were bombing Libyan targets all over again. But the difference was apparent.

In the century of aircraft as an instrument of war, the capabilities of air power have grown exponentially. (The first attack, dropping grenades on a remote camp, produced a few non-combatant casualties and had no significant military effect. That is not true of the air campaign over Libya last year which had significant military and political effects and large-scale civilian casualties.) Over the last hundred years we have seen ever increasing faith in the ability of air power to achieve a set of discrete military and political missions.

[Interestingly, the potential of air power was recognised long before it became reality. In 1907, the major powers signed the Annexes to the Hague Convention which prohibited air attacks on towns, villages, churches and hospitals, even though the technology to do this did not exist at the time! I suppose it is easier to ban what does not exist.]

And we have expanded the way in which we think of air power to include several new aspects. On September 11, 2001, terrorists used air power for their ends, proving that air power is no longer exclusively with the state. The nuclear domain was originally entirely a matter of aircraft, later expanded to missiles and submarines.

Today, the very instruments of power are undergoing change as a result of technological development. You know best how information technology has changed your platforms and empowered both state and non-state actors.

Technology has opened up new domains of contention in cyber space and outer space, and this contention takes unusual or unexpected forms.

In West Asia, since the beginning of 2011 we see the use of cyber space through a new cocktail of Non-Governmental Organisations (NGOs), social

media, saturation TV and Special Forces to arouse people and target regimes. We have seen that virtual reality, working with people's aspirations and hopes, can have kinetic effects, even effecting regime change in certain conditions.

In the last few years, we have made a beginning in India to put in place a series of measures to enhance our cyber security. India is fortunate to have most of the necessary cyber skills, people and knowledge available within our own country.

What we need is the coordination of national effort across the private and public sectors, new ways of organising ourselves, and new habits of working. We are now working on a national cyber security architecture which will enable us as a nation to step up security in this important new domain.

These are domains that require new learning and new national security structures and doctrines, integrating the instruments of national power across sectors.

**Over the last hundred years, we have seen ever increasing faith in the ability of air power to achieve a set of discrete military and political missions.**

### *An Enabling Global Environment*

I mentioned earlier that the external environment is no longer as supportive of the transformation of India as it has been for the last two decades. This extends from the prolonged global economic downturn, to the turmoil in West Asia, to the shifting balance of power in Asia, and the consequential increasing tension around regional hot-spots like North Korea, Syria and Iran.

The financial crisis in the major Western capital markets of 2008, followed by a prolonged downturn in these former drivers of the world economy, has had geo-political consequences. To some extent, they have accelerated previous trends, such as the relative rise of China and some of the other emerging economies, and the shift in the geo-political centre of gravity to Asia. During this decade, the majority of the world's economic growth will take place in the so-called developing world for the first time in over two centuries – driven in large part by China, India and other Asian economies.

**Both our dependence upon, and our influence in, the external world have grown exponentially in the last two decades.**

The economic downturn in the developed countries, combined with the global rise in commodity prices, has given an edge to the natural competition for energy and the resources necessary to sustain economic growth and activity, and for access to markets. We already see the protectionist tinge in developing country rhetoric, and their actions speak louder than their words.

Interestingly, both our dependence upon, and our influence in, the external world have grown exponentially in the last two decades. Today, the external sector accounts for a little over 40 percent of our Gross Domestic Product (GDP), almost twice what it did in 1991, (and half the same proportion for China today). Our access to external markets and resources (including technologies, capital goods and raw materials), therefore, becomes critical not just to the health of our economy but to our national security itself. If we are not able in the years to come to provide the jobs and skills that our young population needs for India to reap the demographic dividend, it will have profound consequences on our internal security.

All in all, we face an external environment where managing uncertainty will form a much larger part of our national security strategy.

### *Creating National Security Capabilities*

We clearly have an ambitious and growing national security agenda flowing from the challenges we face. This naturally raises questions about the adequacy of our institutions and national security structures in dealing with such challenges.

Recognising this, the government has set up a high level task force to review our national security structures, ten years after the report of the Group of Ministers on the national security system after the Kargil conflict began to be implemented. We expect them to report to the government soon, basing their recommendations on the widespread consultations that they have carried out in the country.

The task is to create the appropriate structures or adapt existing national security structures so as to deal with the new challenges. This will not be easy, or necessarily smooth, as the NCTC experience shows, for we are now in uncharted waters. And the barometer is dropping. I would, therefore, argue that creating national security capabilities is our fifth major national security challenge.

Equally, it is essential that our existing capacity performs up to its potential. This is particularly so for our defence industrial base, which is in need of review, upgrading and would benefit from modern management and efficiencies.

But most important is the need to integrate the instruments of national power to deal with the national security challenges that we now face in cyber and outer space, in energy security, and in internal security. That, it seems to me, is what these challenges demand of us.

**In the nuclear domain, an elaborate doctrine of deterrence and balance has been evolved to eliminate the temptation to preemption.**

## FEATURES AND LESSONS

What conclusions can one draw from this broad brush review of our main national security challenges? Two features of these challenges should cause us to question and rethink our strategies and to learn new lessons.

One is preemption or prevention.

Interestingly, in the new domains (of cyber and space), prevention or even preemption can often appear to be the only real and effective response. Reacting after the event or inflicting subsequent punishment does not seem a satisfactory response any more, unlike past military conflicts and situations.

We have already learnt to deal with nuclear conflict and competition differently from conventional conflict. In the nuclear domain, an elaborate doctrine of deterrence and balance has been evolved to eliminate the temptation to preemption. Assured and massive retaliation is what prevents the use of nuclear weapons as war-fighting weapons. In effect, we, and the nature of the weapons themselves, have made the consequences of their use too horrific to contemplate.

But this issue also arises today in relation to terrorism or cyber attacks, where the consequences of waiting for an attack are very serious and sometimes too great to bear. These are also domains where there is a temptation to act before rather than after the event. Here too, we need to evolve doctrines and capabilities and strategies to prevent unacceptable levels of damage. This would require us in India to create capabilities which in themselves will dissuade or deter threats, and will cause our enemies to desist. Increasingly, what we are called to deal with, and develop, are preventive or avoidance strategies.

This is not a theoretical debate though it may sound like one. In the UAPA amendments after the Mumbai attacks, we recognised the need for counter-terrorism to prevent the commission of terrorist acts before they occur. The Act, as passed by Parliament, said in Section 43 that we would do so. But when, almost three years later, we tried to operationalise this provision in the Executive Order establishing the NCTC, there has been considerable debate, to put it politely, about the NCTC taking preemptive action when there is clear evidence that a terrorist act is contemplated. We need to come to a national conclusion on this debate, for events will not wait upon our cogitations.

If prevention and preemption are necessary in counter-terrorism, cyber space and new domains where the speed of operations or scale of damage make traditional responses too tardy, we must also answer questions about the command and control of these functions. Are we being led by technology into more unpredictable actions and hair-trigger reactions just when our complex economies and societies require predictability and steadiness more than ever before? Looking around the world, it certainly appears that while we have managed to keep the nuclear peace, in cyber space, the traditional restraints are no longer operating, and command and political control is tenuous at best.

I must confess that I have no simple solution to offer to these questions. But these are issues that we must think through, and I cannot think of a better audience to pose them to.

Secondly, technology is both the problem and the solution.

It is clear that while empowering the state in its security functions, technology has also empowered non-state actors. We have seen the use of the internet for terrorist recruitment and to radicalise youth, the kinetic effects that manipulating virtual reality can produce, and the sheer lethality that technology places in the hands of individuals.

And as our society gets more complex, advanced and integrated, we are increasing our vulnerabilities and creating platforms for those who want to do us harm. Equally, as it requires more predictability, our society has more to lose if we fail to deal with these challenges. In our search for predictability, we must now plan for the unplanned (like natural disasters), and think the unthinkable (in domains like nuclear war). The scope of what we consider relevant to the defence of India has grown as India has progressed and grown more complex.

The answers to these challenges, whether in cyber space or elsewhere are also to be found in technology.

And to use technology as the solution we must have in India the people with the necessary skills and training to enable us to deal with each of these challenges. We need to invest in our own people, not just by giving them the opportunity to learn and develop the necessary skills but by giving them the careers in this area that would attract them.

## CONCLUSION

By listing these challenges and issues, many of which sound like threats, I do not wish to create alarm or leave the impression that we are in peril. I am acutely conscious of this because doubts have been raised in public recently about our defence preparedness and acquisition process. Debate on these issues within the government is necessary and can be healthy. But public debate on such sensitive issues must have some limits. When it affects national morale and gives comfort to our enemies, it crosses the limits of the acceptable and must be held accountable. We all want more and desire the

**And as our society gets more complex, advanced and integrated, we are increasing our vulnerabilities and creating platforms for those who want to do us harm.**

**There is no cause for defeatism or the ill-informed comments recently seen in motivated leaks and stories in the media.**

best for the nation's defence preparedness. But we must not allow personal prejudice, selfish interest or frog-in-the-well perspectives to lead us into error, creating doubts in the minds of our own people.

Is India secure?

My answer is yes. India is as secure as the dedicated service of generations of us in the military and civil services and in public life can make her.

And this will certainly improve in the future. If there are gaps in our preparedness, they are being addressed and will be filled. No one should be misled by partial revelations or individual views into underestimating this country's capabilities and determination. There is no cause for defeatism or the ill-informed comments recently seen in motivated leaks and stories in the media.

The fact is that the average annual growth of defence capital expenditure during 2001-11 was 12.8 percent. Its share in total defence expenditure has increased from 25 percent in 2000-01 to 40.3 percent in 2010-11. The pace of capital expenditure has also improved over the decade. Since 2002-03, over 97 percent of the revised estimates for the defence capital acquisition budget has been spent each year, and major qualitative enhancements in our defence capabilities are underway.

Ladies and Gentlemen,

I said at the outset that fifty years from now, someone will read what I have said and think how wrong I was. I certainly hope that it will be so. If not, it would mean that fifty years from now, our successors will still be facing the same challenges as us! And that would mean that we had failed to deal with these challenges or had been overwhelmed by them. If they have the luxury of thinking how wrong we were, it would mean that we had dealt with the challenges and threats that we know and foresee today, and that life has moved on.

That there will be new threats and challenges is inevitable. How we deal with them is up to us.

# ROBOTIC AIR LOGISTICS: A TRANSFORMATIONAL CAPABILITY IN WARFARE

MANMOHAN BAHADUR

*My logisticians are a humourless lot....they know if my campaign fails,  
they are the first ones I will slay.*

— Alexander the Great

*The line between disorder and order lies in logistics.*

— Sun Tzu

On December 17, 2011, an epoch-making occurrence took place;<sup>1</sup> it has gone unheralded, but time may show it as a path-breaking event that will revolutionise the use of air power in combat. The first **operational** cargo delivery by an Unmanned Aerial Vehicle (UAV) took place in a combat zone. An unmanned K-MAX helicopter, a Lockheed Martin and Kaman Aerospace venture, transported 3,000 lb of underslung cargo in a two-hour flight to resupply an outpost of the US Marines in Afghanistan. By January 9, 2012, twenty sorties had already been executed in the planned six-month

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Air Vice Marshal **Manmohan Bahadur**, VM is serving with the Integrated Defence of the Chiefs of Staff Committee.

1. *Rotor and Wing*, January 4, 2012, available at <http://www.aviationtoday.com/rw/military/utility/75495.html>, accessed on January 07, 2012.

**An unmanned K-MAX helicopter transported 3,000 lb of underslung cargo in a two-hour flight to resupply an outpost of the US Marines in Afghanistan.**

operational trial of the robotic helicopter.<sup>2</sup> Neil Armstrong may well have said, “A small hop for a helicopter, but a giant step for combat air power.”

Well, what’s so great about this? Actually, the earliest unmanned devices were balloons filled with explosives, used by Austria way back in 1849 to attack Venice.<sup>3</sup> Unmanned aircraft first flew almost a century ago in World War I and development of drones continued post World

War II feverishly, as the Americans were aware of the dangers to their spy planes being targeted by the Soviets – their fears came true in 1962 when Gary Powers’ U-2 was shot down. The Israelis showed great tactical use of their drones in the 1982 Bekaa Valley action, which was the first integrated Electronic Warfare (EW) campaign built on blinding the enemy air defence – the 82:1 kill ratio points to their success. And, there are a dime a dozen drones flying in the world’s skies, with the ones in the Af-Pak region making news daily. So, where lies the uniqueness about the Afghanistan K-MAX unmanned robotic supply mission?

This paper will examine the impact that robotic air delivery would have on the logistics of the ground battle.

### **IMPORTANCE OF LOGISTICS**

Logistics is a function of command – if treated only as a support arm, the repercussions could be many. Supply of troops is a charge that all commanders hold dear; it is one of the primary tasks, as no operational plan can go through successfully without a suitably intermeshed logistics approach. It is the commander’s intent that determines troop movements as per a strategy devised by him. The fog of war makes the best of plans go

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2. *The Times of India* (New Delhi), January 9, 2012.

3. Dr Christina J. M. Goulter, “The Development of UAVS and UCAVs: The Early Years” in Owen Barnes, ed. *Air Power UAVs: The Wider Context* (Royal Air Force Dte of Defence Studies), available at <http://www.airpowerstudies.co.uk/UAV-Book.pdf> p. 14, accessed on January 5, 2012.

awry, throwing schedules out of sequence and generating unwanted and undesired trajectories of personnel and equipment trails. A good commander is one who is *au fait* with the happenings and who maintains his logistics in sync with the operational ground realities; if it is the converse, i.e., if he has to maintain his operations as per the logistics schedule and availability, then it is an indication of a comedown and incorrect logistics planning. The campaign plans must fully integrate operational and logistic capabilities. The logistic stream, thus, has to stay wedded to a commander's operational requirements, as a mismatch may result in the loss of combat force and consequently, its morale.

Logistics functions comprise three basic steps, viz, production or procurement, strategic allocation of materials and, lastly, inter or intra theatre logistics;<sup>4</sup> the third step implies positioning the allotted material and/or equipment at the right place, at the right time and in the desired quantity.

Historically speaking, in the centuries gone by, war campaigns saw the victors foraging and pillaging the vanquished countryside to feed their troops. Alexander's army's great 11,250-miles march in eight years to the river Beas in India was, for the most part, fed through such methods<sup>5</sup> and this practice actually continued till World War II when both sides lived off the land, as it were, as the logistic lines got extended;<sup>6</sup> non-provisioning or interruption in availability led to operational setbacks. The most famous example of an operation getting delayed is the one of Patton having had to slow down his Third Army in 1944 in its drive through France due the fuel logistics chain not having kept pace with his furious advance. Patton is reported to have remarked, "At the present time, our chief difficulty is not the Germans, but gasoline. If they would give me enough gas, I could go all the way to Berlin!" In the event, he had to stop all movement for a week which paid put

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4. Chris Madsen, "Strategy, Fleet Logistics, and the Lethbridge Mission to the Pacific and Indian Oceans 1943-1944," *Journal of Strategic Studies*, vol 31, no 6, December 2008, p. 951.

5. Maj Gen Julian Thompson, *The Lifeblood in War: Logistics in Armed Conflict* (London: Brassey's (UK), 1991), p 16. Also see Donald W. Engel, *Alexander the Great and the Logistics of the Macedonian Army* (Berkeley USA: University of California), p. 120.

6. Paul Kennedy, *The Rise and Fall of the Great Powers* (London: Unwin Hyman Ltd, 1988), pp. 308-309, 362.

**Distance, timeliness, and quantity are the perennial concerns of logistics; put in other words, how far, by when, and how much.**

to his plans of being the first to reach there.<sup>7</sup> Distance, timeliness, and quantity are the perennial concerns of logistics; put in other words, how far, by when, and how much.<sup>8</sup>

#### LOGISTICS MOVEMENT

Post procurement and allotment, the final step is the positioning of the load at the required locations (how far, by when and how much). The cheapest and most efficient way is by road or rail and when cartage volumes are considered, no other means come anywhere near the intrinsic advantage that this surface mode has. This paper will consider the effect of robotic air delivery on logistic provisioning in forward operational areas only.

In operations, an advancing force, as it moves away from its holding point or concentration area, gets into a position of disadvantage in terms of assurance of logistics. This is because its supply line starts getting extended, just as it happened in the case of Patton in his drive through France. When viewed from the side of the defender, availability of supplies becomes problematic when a siege like situation develops due to disruption of the supply lines by the attacker – the sieges of Dien Bien Phu and Stalingrad are examples. The recourse left is to supply the units/garrisons by air. This is easier said than done and one only needs to go back in the history of air power to get the full import of this statement. The Germans, in the Battle of Stalingrad in World War II, lost 488 aircraft and 1,000 aircrew in their attempt to supply their men surrounded by the Russians. In Indo-China, the French lost 62 aircraft in their endeavour to support their troops in the May 1954 siege of Dien Bien Phu.<sup>9</sup> More importantly, both the countries lost the battles and

7. Daniel G. Grassi, "Refuel on the Move: Resupplying Patton's Third Army," *US Quartermaster Professional Bulletin*, Summer 1993, available at <http://www.qmfound.com/pol.htm>, accessed on 11 Jan 12.

8. Madsen, n. 4, p. 952.

9. Dr. David K. Vaughan and Maj James H. Donoho, "From Stalingrad to Khe Sanh: Factors in the Successful Use of Tactical Airlift to Support Isolated Land Battle Areas," *Air & Space Power Journal - Chronicles Online Journal*: available at <http://www.airpower.au.af.mil/airchronicles/cc/vaughan.html>, accessed on January 21, 2012.

due to loss of national morale, the two events became turning points in the two conflicts. In Vietnam, of the 5,000 plus helicopters lost by the Americans<sup>10</sup> many were on routine errands like taking hot *chow* (food) for the troops on the front lines – this was a morale aspect being addressed, but the loss of the helicopters and aircrew on such routine logistics sorties was not a small price to pay.

The positioning of logistics has hitherto been by surface means and, after man took to the air, fixed-wing aircraft and helicopters have been added as another mode. Thus, a prime method of strangulating an opponent or taking the momentum out of his manoeuvres is by denying him his logistics. Denial of logistic supplies is possible by interdicting an opponent's supply lines so as to raise the costs for him in terms of the supplies and human lives in his endeavour. Thus, in conventional war, where the supply lines are generally defined and located in territory under the control of the opponent, it requires overt offensive action by interdiction; the situation, however, is different where the opponent is a non-state actor and the conflict is in the domain of Irregular Warfare (IW). It is not why the conflict is being contested but *how* it is being fought and the scene of action is on one's own soil and not that of the opponent; disrupting supply lines of the state becomes an important activity for the insurgent as it gives the following dividends:

- Ties down a large number of human and material assets of the state as it attempts to protect its supply routes.
- Causes supply losses and brings in an element of uncertainty in the minds of the state forces about the efficiency and determination of the insurgents.
- Propaganda value by hyping the state of morale of the insurgent movement.

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10. Jacob Wise and Desmond Young, "Helicopters: The Tactical Innovation of the Vietnam War" in Eau Claire, ed., *Vietnam: A Historical Geography* (University of Wisconsin, 2010), available at [http://www.uwec.edu/webprojects/geog445/helicrash\\_byyear.html](http://www.uwec.edu/webprojects/geog445/helicrash_byyear.html), accessed on February 4, 2012.

**Road convoys in insurgency prone areas have become very lucrative targets for Improvised Explosive Devices (IEDs), roadside bombs and ambushes.**

Future armed conflicts have been predicted to be of the low intensity type in which insurgency will dominate.<sup>11</sup> Counter-insurgency warfare calls for establishing control over an area where the writ of the state has been challenged by group(s) inimical to the state. This challenge is not peaceful but takes recourse to armed action against the state. To maintain or reestablish control in the area, the presence of the different arms of the government is necessary. Thus, there are outposts of government armed forces that have to be supported logistically

from some secure base at the rear<sup>12</sup>.

Road convoys in insurgency prone areas have become very lucrative targets for Improvised Explosive Devices (IEDs), roadside bombs and ambushes. While no official details are available regarding deaths due to IEDs in India, this weapon of the insurgent has been a low cost foil to technology intensive weapons of the modern world. *The Washington Post* reported that by 2007, "...IEDs have caused nearly two-thirds of the 3,100 American combat deaths in Iraq, and an even higher proportion of battle wounds..... they have also resulted in an estimated 11,000 Iraqi civilian casualties and more than 600 deaths among Iraqi security forces."<sup>13</sup> The latest figures put the Americans having lost 3,008 soldiers to such attacks in Iraq and Afghanistan.<sup>14</sup> Casualty sensitivity is high in the modern world and tolerance of the civic society to bear such losses of soldiers is low and continuing to go down. This has resulted in road convoys for certain missions and operational areas being replaced by aerial lifts, mostly by helicopters. The

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11. Thomas G. Weiss, *What's Wrong with the United Nations and How to Fix It* (Cambridge, UK: Polity Press, 2008), pp. 27-28.

12. In India, the Air Force has the additional charge of air maintaining many remote Army border posts because of their inaccessibility due to absence of roads, weather or due to their peculiar location on the border.

13. Rick Atkinson, *The Washington Post*, September 30, 2007, available at [http://www.washingtonpost.com/wp-dyn/content/article/2007/09/29/AR2007092900750\\_pf.html](http://www.washingtonpost.com/wp-dyn/content/article/2007/09/29/AR2007092900750_pf.html), accessed on January 30, 2012.

14. DoD Personnel and Military Casualty Statistics from October 7, 2001, till January 03, 2012, available at [http://siadapp.dmdc.osd.mil/personnel/CASUALTY/gwot\\_reason.pdf](http://siadapp.dmdc.osd.mil/personnel/CASUALTY/gwot_reason.pdf).

opposition has got smarter and has started targeting helicopters using small arms and Recoilless Portable Guns (RPGs), with disastrous consequences.<sup>15</sup> One major reason for the withdrawal by the Russians from Afghanistan in 1989 was the loss of tactical supremacy afforded by the once 'invincible' helicopter gunship. The US supplied Stingers took a heavy toll of the Mi-24s and Mi-25s, forcing the Russians to fly higher, resulting in a higher success rate of ambushes of road convoys. The downing of an American Chinook recently (December 2011) in Afghanistan, causing the loss of 30+ lives, made headlines, as 22 of the fatalities were from the same Navy Seals unit that took part in the Osama bin Laden raid in Pakistan. Earlier, in 1996, the Indian Air Force lost an Mi-17 in the Siachen Glacier area after being hit by a missile while on a logistic resupply mission to an Army post in the Siachen Glacier.<sup>16</sup> And within the country itself, the Flight Engineer of an Indian Air Force Mi-17 helicopter was killed in November 2008 when it was fired upon by left wing extremists in the Chattisgarh area.<sup>17</sup> The RPG has brought in an element of helplessness in the cat and mouse game between the helicopter and the insurgent – as yet, no solution has been found to the almost fatal consequences to a helicopter if an accurately aimed RPG hits it at a vital spot.<sup>18</sup> Thus, the relative safety of vertical separation from hostile ground forces afforded to a helicopter has been eroded and begs a solution as, besides loss of lives, the propaganda advantage that accrues to the insurgents is disproportionately high.

So, what was the solution to this low cost but potent threat to an indispensable means of logistic delivery? The solution lay in analysing the three aspects in the loss of a helicopter or aircraft to ground fire, viz, loss of aircrew, loss of the aerial vehicle and supplies and propaganda gain

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15. An officer writing in *Marine Corps Gazette*, recently put it (the ability of the insurgents to adapt to counter-measures) as, "The Flintstones are adapting faster than the Jetsons." *The Washington Post*, September 30, 2007.

16. See <http://www.bharat-rakshak.com/IAF/Personnel/Martyrs/198-4-99-Siachen.html>

17. Many more such incidents of firing on helicopters have since taken place and reported widely in the press, luckily with only some damage to the helicopters and no casualties; for example, see [http://articles.timesofindia.indiatimes.com/2011-12-26/india/30558392\\_1\\_iaf-chopper-naxal-fire-jagdalpur](http://articles.timesofindia.indiatimes.com/2011-12-26/india/30558392_1_iaf-chopper-naxal-fire-jagdalpur)

18. Col David Eshel , "Deadly Scourge of the US Helicopter Pilots in Iraq", available at <http://defense-update.com/newscast/0207/analysis/analysis-100207.htm> , accessed January 30, 2012.

**With advances in robotic technology, data transfer rates and automation in flying bodies, a concept of unmanned delivery of logistics supplies was mooted by the United States Marine Corps.**

by the adversary. Any reduction in any of these variables would benefit the commander, besides saving lives, an aspect that outweighs everything else and is considered paramount.

#### THE 3-DS

Provisioning of logistics supplies can be categorised as part of tasks that form 'the three Ds' – jobs that are 'dull, dirty and/or dangerous'. Dull assignments are those that require routine functions, dirty jobs are performed in harsh environmental conditions, while dangerous missions involve tasks in which humans could suffer physical harm.<sup>19</sup> Robots have proven most efficient and cost-effective in such 3 D combat tasks. With advances in robotic technology, data transfer rates and automation in flying bodies, a concept of unmanned delivery of logistics supplies was mooted by the United States Marine Corps in the last decade of the 20<sup>th</sup> century. Kaman Aerospace was awarded a \$4.2 million contract in June 1999 to design, build and install a remote piloting package in a K-MAX helicopter as part of the Marine Corps' programme christened Broad-area Unmanned Responsive Resupply Operations or BURRO. The objective of the BURRO concept was to demonstrate the feasibility of using an unmanned vertical take-off and landing platform to deliver supplies to widely dispersed troop locations in a battle zone.<sup>20</sup> This capability was to conduct sea-based autonomous resupply in support of the Marine Corps' Operational Manoeuvre from the Sea (OMFTS) war-fighting concept, and the enabling concept, Ship-to-Ship Manoeuvre (STOM).<sup>21</sup> The acronym BURRO was targeted at the hardy **burro**, a small donkey used primarily as a pack animal.

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19. James Jay Carafano and Andrew Gugel, "The Pentagon Robots: Arming the Future", *Backgrounder*, no 2093, (The Heritage Foundation, 2007) available at <http://www.heritage.org/research/reports/2007/12/the-pentagons-robots-arming-the-future>, accessed on January 25, 2012.

20. Details at Kaman Aerospace website <http://www.kaman.com/news/u-s-marine-corps-awards-follow-on-contract-to-kaman-for-development-work-on-remotely-piloted-k-max-s/> accessed on January 22, 2012.

21. "Unmanned Aerial Vehicle Roadmap 2000-2025", US DoD document issued from the Office of the Secretary of Defence, Washington, April 6, 2001, p. A 17.

**Fig 1**



<http://www.uasvision.com/2011/10/07/us-marines-take-k-max-to-afghanistan/>

The BURRO programme, within a year, was drawing attention in UAV literature<sup>22</sup> and its progress was keenly followed. In less than a year, in May 2000, Kaman was given a follow-on order of a \$2.7 million contract by the Marine Corps War-fighting Lab for further development in terms of advanced capabilities that included coupled navigation culminating in a fully automated BURRO, which could navigate a pre-programmed

22. Air Vice Mshl R.A. Mason, "The Development of UAVS andUCAVs: The Early Years" in Barnes, ed., n. 3, available at <http://www.airpowerstudies.co.uk/UAV-Book.pdf>, accessed on January 05, 2012. AVM Mason writes, "In April 2009, the US Marine Corps was reported to be seeking an unmanned cargo aircraft for resupply of forward operating bases." p. 118.

course without human intervention, while carrying an external load. The ultimate goal of the BURRO was an automated cargo delivery system capable of safely delivering supplies to a precise location. The aircraft's enhanced capabilities were to be demonstrated, which would include a 6,000 pound payload capacity, long-range (50 mile) data link, and auto-take-off/auto land capability. Ease of operations was a major criterion and the company claimed that that the system would not require a rated pilot.<sup>23</sup>

The programme was built on the basic K-MAX, which is a single pilot proven external load carrying helicopter used mainly for logging operations. It has 6,000 lb of payload and can carry 4,300 lb at 15,000 ft. Kaman claimed that in Federal Aviation Administration (FAA) approved tests, it pushed all the K-MAX components to the limits by stressing them to full power cycles, 30 times per hour, for the entire life of the components. No other helicopter, let alone any other UAV, has been tested to such extremes, the company said. The K-MAX also has the ability to perform multiple cargo air-drops to different locations using the aircraft's four hook carousel.<sup>24</sup>

## PRINCIPLES OF LOGISTICS

For the BURRO to prove its worth and be successful, its output has to be weighed against the principles of logistics. The British Army has five "Principles of Administration" while the Americans have nine; these are logistics intelligence, objective, general logistics, interdependence, simplicity, timeliness, impetus, cost-effectiveness and security.<sup>25</sup> Of these, the last four, viz., timeliness, impetus, cost-effectiveness and security are directly affected by the final step of the logistics functions i.e., the positioning of the load at the required location(s) (how far, by when and how much). Timeliness is self-explanatory in that the required item/equipment should be available at the time required for operations. Impetus implies forward motion or drive

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23. n. 20.

24. Ibid.

25. Maj Gen Julian Thompson, *The Lifeblood in War: Logistics in Armed Conflict* (London: Brassey's, 1991), p. 7.

– “the need to support well forward, right into or close behind the fighting units’ areas”, as the Americans expect. Thus, the items being provisioned should reach as far forward as required by the operational staff, and not require them to continuously wonder whether the supply is fetching up or not.<sup>26</sup> Cost-effectiveness and security are inter-linked, in terms of both financial aspects and human lives. If the logistics train is not secure, then it would result in losses in both these facets, with the impact of loss of life being an unquantifiable entity.

In comes the K-MAX BURRO in such a scenario. It flies as an unmanned pre-programmed autonomous machine or as an unmanned pilotable (from ground) helicopter with the supplies underslung beneath it. The automated K-MAX takes off with the load, goes to the programmed height (out of harm’s way from ground threats), flies a designated route, descends to the destination helipad and releases the load when it (the load) touches the surface. The BURRO then takes off for a subsequent area to deliver the remaining load or returns to base to be serviced and refuelled for a subsequent sortie – this cycle can continue many times and would be limited only by bad weather or technical limitations. Since it flies with sophisticated automated equipment, the K-Max BURRO can fly at any time of day or night and the supplies delivered with pinpoint accuracy and almost negligible, if not zero, losses – in automated flying, the instruments get feed from sensors that judge the movement of the vehicle in the atmosphere; thus, day or night has no influence on the ability of the vehicle to be controlled in a robotic mode. In times of a hot war, the K-MAX would be a legitimate target, but its loss would not involve any aircrew – a big issue in these times of low casualty sensitivity. With net-centricity and Remote Split Operations (RSO) becoming an everyday affair in the Afghanistan and Iraq Wars,<sup>27</sup> these BURROs can be redirected by a commander to places requiring emergent logistics assistance. Thus, the logistics supply would be timely, of the required amount and positioned with pinpoint accuracy, fulfilling the ‘principles of logistics’.

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26. Ibid., p. 8.

27. Maj Brad W. Borke, “Global Dynamic Operations”, *Air and Space Power Journal*, Spring 2010, (Maxwell Air Force Base), p. 75.

**The United States Air Force wrote in an 82-page report titled “Unmanned Aircraft Systems Flight Plan 2009-2047, “that *autonomous drone aircraft are key” to increasing effects while potentially reducing cost, forward footprint and risk”.***

The present mission of the Lockheed Martin Kaman Aerospace team is to run the K-MAX BURRO through a six-month operational trial period in Afghanistan for the US Marines. Is this a one-off UAV plan that has been generated because of Iraq and Afghanistan? No. The United States Air Force wrote in an 82-page report that outlined the future usage of drones, titled “Unmanned Aircraft Systems Flight Plan 2009-2047, “that *autonomous drone aircraft are key” to increasing effects while potentially reducing cost, forward footprint and risk* (emphasis added).”<sup>28</sup> The report makes interesting reading as it states that by the year

2047, the computing powers will be such that there will be no human ‘in the loop’ but he would be ‘on the loop’, implying that decision-making capability would transfer to the Unmanned Aircraft System (UAS) and humans would be present only in a monitoring role. The report adds that, “Simultaneously, advances in Artificial Intelligence (AI) will enable systems to make combat decisions and act within legal and policy constraints without necessarily requiring human input.”<sup>29</sup> Thus, as the BURRO K-MAX technology matures, the system would get even more automated, with the ‘powers to decide’ transferring to the machine – this would lead to further saving in manpower and reduction in objectivity in decision-making. Logistic provisioning in an area would become more automated, as a larger number of principles of logistics (enumerated earlier) would be brought under the ambit of decision-making by the UAS. Threat level and weather assessment in an area, heights and speeds to fly at, descent pattern to match the threat at the landing base, etc would be factors that would be determined by the UAS and modified by it, as the logistics campaign progresses in sync with the commander’s plan. Consequently, day/night, and weather, to a certain extent, would not

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28. *United States Air Force Unmanned Aircraft Systems Flight Plan 2009-2047*, HQ USAF, Washington DC, May 18, 2009, available at <http://www.govexec.com/pdfs/072309kp1.pdf>, p.14.

29. *Ibid.*, p. 41. flt plan UAS.

be hindrances to continuous logistic stocking of remote bases and outposts whose approaches by road are not secure due to hostile activity.

A caveat needs to be added here, lest an impression of total invincibility is painted for the BURRO or any other such robotic supply mission tools. The air space environment in Afghanistan is totally benign. The International Security Assistance Force (ISAF) and the North Atlantic Treaty Organisation (NATO) complement have total air dominance in the area of conflict; thus, the BURRO has no threat of an aerial engagement.

With underslung load, any aerial interception would be fatal for the robot, unless escorts are made available to it. Should there be manned escorts to an unmanned machine like the BURRO K-MAX? It would defeat the very purpose of utilising unmanned aerial machines in a particular sector. What if the unmanned BURRO was escorted by unmanned combat aerial vehicles with the power to take decisions? The answer to this is covered later in this paper; suffice to say that air dominance and aerial asymmetry, such as that prevalent in Afghanistan, would be a rarity (if not an impossibility) for the next few decades in most of the areas of conflict in the world.

### **IMPORTANCE FOR INDIA**

The implications for India are many, if we were to acquire this technology. At present, other than some areas affected by left wing extremism, there are not many regions that have unsafe approach roads. But availability of this capability would ensure that there would be a competency on hand, in case such a requirement arose. However, operations in certain parts of the northern areas could benefit with automated air maintenance being done by night when the temperatures are lower, which results in greater load carrying capability of a helicopter – this is a theoretical statement, as the performance graphs of the helicopter being used would be the defining document, especially with underslung load which requires Out of Ground

**Operations in certain parts of the northern areas could benefit with automated air maintenance being done by night when the temperatures are lower, which results in greater load carrying capability of a helicopter.**

Effect (OGE) hover load carrying capability. Another factor that would be of vital importance would be the narrow valleys, where launching such automated missions could be suspect. But, stretching the time horizon a little more, suppose the robot helicopter had Electro Optical (EO)/Infra-Red (IR) pods that beamed back in real-time the visuals around the helicopter? Well, a human could be put in the loop to monitor the flight path of the helicopter and flown safely from a base station in a virtual world, if required! Is this a far-fetched idea? Certainly not, if one considers that the Americans are already planning this as per their UAS Flight Plan 2009-2047:

The near-term concept of swarming consists of a group of partially autonomous UAS operating in support of both manned and unmanned units in a battlefield while being monitored by a single operator. Swarm technology will allow the commander to use a virtual world to monitor the UAS both individually and as a group. A wireless ad-hoc network will connect the UAS to each other and the swarm commander. The UAS within the swarm will fly autonomously to an area of interest (e.g. coordinates, targets, etc.) while also avoiding collisions with other UAS in the swarm. These UAS will automatically process imagery requests from low level users and will “detect” threats and targets through the use of artificial intelligence (AI), sensory information and image processing. Swarming will enable the UAS network to deconflict and assign the best UAS to each request.<sup>30</sup>

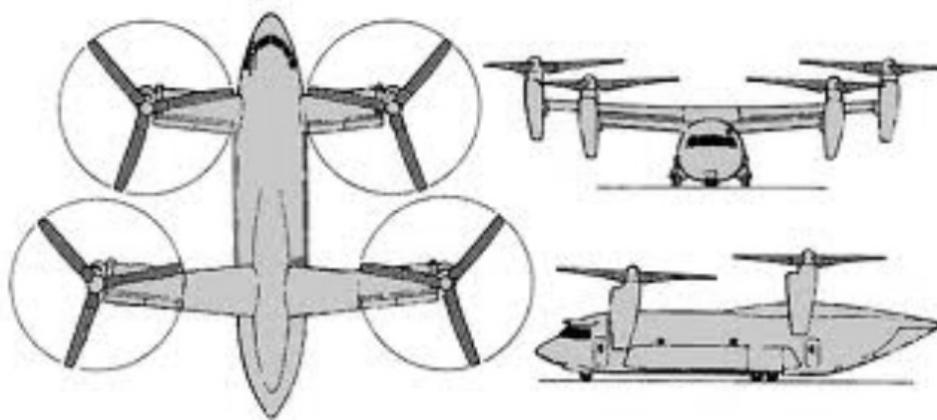
Going a step further, the Bell company in the USA is developing a C-130 class quadrilateral tilt rotor aircraft called ‘Quad Tilt Rotor’ (QTR) that would take off like a helicopter, translate to fixed-wing flight by tilting its four rotors forward, like the V-22 Osprey, and land at the destination as a helicopter once again. It would, thus, have the advantages of Vertical Take-Off and Landing (VTOL) and high forward speed like a fixed-wing aircraft. Large volumes could then be transported to much greater distances at high

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30. *USAF Unmanned Aircraft Systems Flight Plan 2009-2047*, HQ USAF, Washington DC, May 18 2009, available at <http://www.govexec.com/pdfs/072309kp1.pdf>, p 34.

speeds – typically, fly at 300+ miles per hour and be able to vertically deliver a 20-ton payload 500-1,000 miles.<sup>31</sup> Adaptation of unmanned autonomous capability would be easily achieved from the BURRO K-MAX trials and field usage. This, however, would be a call that would require deep evaluation, as transporting such a large amount of cargo or a large number of humans, without a man in the loop (pilot on board) would be a risky proposition. Whether this could form part of the swarm philosophy of the Americans is difficult to say at this stage but a mix of manned quad tilt rotors and some unmanned quads, with the former controlling the latter in a formation, is not something that can be discounted. Thus, insertion of a fighting group from a continental base direct to a scene of conflict at a future point in time, with all complete support, is not in the realm of fantasy. Imagine if Patton had this capability in his drive through France in World War II! His thrust would not have lost the momentum, as K-MAXs with underslung fuel bladders would have supplied his troops to his rear areas; or, quad tilt rotors with 20-ton payloads of fuel (in each quad) could have flown directly from Britain without them being brought first by ship to French ports and then transported by trucks to his field army.

Fig 2



31. See <http://www.globalsecurity.org/military/systems/aircraft/qtr.htm>, accessed on January 23, 2012.

**The quad tilt rotor would be for a different role altogether, ie, to induct large cargo and fighting groups directly to the zone of engagement.**

### **ECONOMICS OF THE PROJECT**

Cost is one of the principles of logistics. In terms of capital, the Chief Executive Officer (CEO) of Kaman Aerospace claimed that the K-MAX uses less than half the fuel of manned assets with similar payloads, with fuel cost savings of more than \$85 million in one year alone.<sup>32</sup> Add the pure logistic support sorties flown in Afghanistan and Iraq, and one would get an idea of the colossal savings that would accrue. The savings in cost with automated quad tilt rotors (if the principle is accepted) would be even larger, as intermediate transit points (initial positioning at a base by fixed-wing aircraft and/or ships and then load transfer to helicopters) would be avoided. The saving of lives that would result from automated aerial delivery cannot but be underscored – it would be an intangible that cannot be priced and would be welcomed by the military hierarchy as well as by the political leadership (in more ways than one).

### **CONCLUSION**

So, where does technology take us from the K-MAX operation? An army can, in future, plan to deploy and keep supplied its armed posts in areas whose access is difficult due to road-bound threats. The human toll in road convoys due to IEDs, roadside bombs and ambushes would be greatly reduced and aircrew losses due to missile and small arms hits from ground forces on aircraft and helicopters on supply missions, eliminated. If the K-MAX experiment succeeds (and there are no indications that it would not), then the next step could be the adaptation of the tilt rotor V-22 for such supply missions as the loads carried would increase substantially. The quad tilt rotor would be for a different role altogether, ie, to induct large cargo and fighting groups directly to the zone of engagement, and as brought out earlier, its automated flight would call for a deep introspection and debate.

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32. Full transcript of interview with Mark Tattershall, Director, Marketing and Business Development, Kaman Helicopters, with *Rotor & Wing* magazine, available at <http://www.aviationtoday.com/rw/military/utility/71406.htm>, accessed on January 22, 2012.

The availability of air dominance in the sector would be a requirement in case of a hot war, and would be an important planning and decision-making criterion.

Would the BURRO K-MAX herald a revolution in the conduct of military operations? Only time would answer that, but one needs to remember that the inventions of the wheel, gun powder, telegraph and railroad were also viewed as innocuous events but transformed the battlefield in more ways than one. The country that did not or was slow to adopt the technology did so at its own peril. As they say, war is all about logistics. The operationalisation of the unmanned K-MAX may be the harbinger of such a coming – for sure, it cannot replace logistics by road, but automated replenishment by air, come day or night, would serve as a game changer in certain key and pivotal operations. The Dien Bien Phus, Stalingrads and Afghanistans (the British in the earlier part of 20<sup>th</sup> century and the Soviets in the later period), where the long lines of communications could not be protected,<sup>33</sup> may become a thing of the past with the robotic delivery of logistics by air power. May be it's time to add another 'T' in a famous adage and say, "Time, tide and technology wait for no man."

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33. Sarah E. Kreps, "Air Power's Role in Asymmetric Operations: The Case of the Second Lebanon War" in Joel Hayward ed., *Air Power, Insurgency and War on Terror* (Cranwell, UK: RAF Centre for Air Power Studies), available at <http://www.airpowerstudies.co.uk/Hayward%20Insurgency%20Book%20%20A5%20Web.pdf>, p. 155.



# REVOLUTION IN MILITARY AFFAIRS

**RAJ KUMAR UPADHYAYA**

The Soviet military thinkers first asked questions about the Revolution in Military Affairs (RMA) during the mid-Sixties, with respect to the impact of nuclear weapons and Intercontinental Ballistic Missiles (ICBMs). They believed that the employment of nuclear weapons would change the course of future warfare. It was in the mid-1980s that Nikolai Ogarkov, Chief of the Soviet General Staff, reviewed the debate about the RMA with reference to precision guided conventional weapons. It was only after this that American strategic experts coined the term RMA.

The full realisation of the RMA has three preconditions: technological development, doctrinal innovation and organisational adaptation. History tells us how technological developments have fundamentally changed the pattern of war. The technological development to achieve RMA must begin with the operational context and combat environment considerations. Emerging technologies will, no doubt, result in the development of advanced, and highly capable military systems but there is every likelihood that modern technologies will influence warfare in four areas which, in turn, would affect the conduct of war. These areas are: 'precision strike', 'information warfare', 'dominating manoeuvre' and 'aerospace warfare'. Of all these, information warfare has become more important because of the development in computerised information and telecommunication technologies and related innovations in management and organisational theory.

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**The full realisation of the RMA has three preconditions: technological development, doctrinal innovation and organisational adaptation.**

New tools and processes of waging war like information warfare, network-centric warfare, integrated command and control, system of systems all powered by information technology have led to the RMA. This broadens the parameters of thinking about national security. The members of the international community are now on the brink of a major revolution regarding how to conduct national security affairs. The reunification of the RMA needs to be understood not only by military officers but also by strategic planners – both military and civilian. The military has to contend with the fifth dimension of warfare, particularly information, in addition to the developments in land, sea and space warfare.

### **REDEFINING RMA**

There are by definition, significant differences between evolutionary and revolutionary changes. In the security context, these differences can be described as follows: while, on the one hand, evolution is the logical progression of an existing system of the framework, revolution, on the other, connotes a fundamental break with precedent, and performance improvements which signal a tactical revolution. A truly revolutionary strategic development emerges after perceptions of the relationship of means to ends and, most importantly, a reformation of the war-fighting doctrine – the codified precepts that govern military operations.<sup>1</sup>

Accordingly, revolutions are not merely more clever technological breakthroughs than ordinary evolutionary innovations; these revolutions are more profound in both their sources and implications.<sup>2</sup> They involve fundamental discontinuities, i.e. dramatic breaks with the existing status quo. It is important to recognise that a revolution is not simply an existential condition – i.e. created simply by the appearance of new technological

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1. Lt. Leo S. Mackay, Jr., USN "Naval Aviation, information, and the Future," *Naval War College Review*, Spring 1992, p.7.
  2. Jeffery R. Cooper, *Another View of the Revolution in Military Affairs* (Carlisle Barracks, PA: US Army War College, Strategic Institute, 1994), p.23.

capabilities. Without recognition and exploitation, both requiring positive action, there can be no revolution. Creating a revolution is, therefore, more than pushing the limits of military technology; it is an active process that requires effective adaptation by individuals and organisations for successful exploitation to occur.<sup>3</sup>

The RMA movement is not motivated only by the allure of modern technology; other factors are at work as well. Some believe that only a high technology, stand-off warfare force can be the superior fighting force – the US military usable in a domestic political context, given the Americans’ aversion to suffering casualties. This philosophy guided the North Atlantic Treaty Organisation’s (NATO’s) 1999 War over Kosovo, in which the United States lost no troops to hostile action and only two people in the entire operation – largely as a result of the decisions to eschew an early ground invasion and to fly combat missions from high altitudes. Truly speaking, revolutionary developments do not merely enhance the ability to fulfill existing missions, but are also best suited to perform new functions. However, if these new functions are not captured in the accepted method of assessment, innovative developments may not appear to offer significant operational enhancements. Thus, as the environment is affected by revolutionary innovation, it may no longer be appropriate to evaluate the effectiveness of old measures. The new modes of operation may no longer be relevant to the altered objectives.<sup>4</sup> With revolutionary military innovation, fundamental change in the war-fighting paradigm is almost guaranteed. Most analysts define RMA as a **“discontinuous increase in military capability and effectiveness”** arising from simultaneous and mutually supportive change in technology systems, operational methods and military organisations.<sup>5</sup> The Pentagon’s official concept of the RMA is,

**As the environment is affected by revolutionary innovation, it may no longer be appropriate to measure the effectiveness of old measures.**

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3. Ibid., p.23.

4. Ibid., p.24.

5. Steven Metz, James Kievit, “Strategy and the Revolution in Military Affairs: From Theory to Policy,” June 27, 1995.

as noted, remarkable for its ambition. It focusses on information systems, sensors, new weapons concepts, much lighter and more deployable military vehicles, missile defence and other capabilities. The watchwards for effecting this transformation, employed earlier in the Joint Vision 2010 – dominant manoeuvre, precision engagement, full-dimensional protection, and focussed logistics – imply light, agile, deployable main combat forces. Precision engagement conjures up images of very accurate and lethal long range firepower. Full dimensional protection suggests, among other things, highly effective missile defences.

Advanced conventional munitions have made spectacular advances in lethality by linking near- real-time information to precision-guided weapons controlled by digital command and control systems. Bombing has become so precise that weapon systems can routinely attack not just buildings or rooms, but even a corner of a room that will bring everything down – even the vent shaft that will put the bomb inside the shelter.<sup>6</sup> This may enable us to view the venerable **military principle of mass** from an entirely different perspective and alter the traditional relationship between offence and defence. A defender, equipped with these sophisticated munitions, can inflict unacceptable damage on an attacker before the latter can likewise reciprocate.<sup>7</sup>

The sensor revolution, which was enabled by the computerisation of individual platforms and weapon systems, complements these advances in weapons lethality. An individual platform – manned or autonomous – can now detect and attack individual vehicles, ships or aircraft well beyond visual range, and provide targeting information on a near- real-time basis to long-range offensive attack systems. Additionally, these sensors are becoming fully integrated with traditional command and control systems to achieve synergies which were never possible before. The Airborne Warning and Control System (AWACS) and the new E-8A Joint Surveillance and Target Attack Radar System (JSTARS) aircraft, which couple high-

6. Lt. Col. Edward Mann, USAF, "One Target on Bomb; Is the Principle of Mass Dead?" *Military Review*, September 1993, p.37.
7. Lt. Col. Lester W. Grav, USA, "In the Wake of Revolution, Continuity and Change: A Soviet General Staff View of Future Theatre War," *Military Review*, December 1991, p.11.

technology sensors and communications with command personnel, are but two examples of this kind of Command, Control, Communication, Intelligence (C<sup>3</sup>I).

### REVOLUTION IN STRATEGIC AFFAIRS

In the past, military commanders did not have the C<sup>3</sup>I capabilities to manage military forces to the limit of their potential effectiveness.<sup>8</sup> They had to rely on increases in the individual components of combat power i.e. mass, mobility, reach and firepower or the exploitation of an opponent's failing, to make up for these inadequacies. The associated costs were high not only in resources, but also in organisational distortions and operational constraints. What was often referred to as the "fog of war" in reality is a form of disorder: the inability to maintain unity of action due to shortcomings in the C<sup>3</sup>I systems.<sup>9</sup>

RMA proponents tend to be somewhat anti-Clausewitzian, unlike the 19<sup>th</sup> century German strategist Carl von Clausewitz, who coined the famous phrase "fog of war" to describe the unpredictability and confusion of battle. They believe that future militaries should attempt to achieve information dominance – and that a winning force will probably succeed in establishing it. They believe that future militaries will be able to depend on highly complex and integrated communication systems that enable them to fight in cohesive and complex ways. That basic concept tends to run counter to the Clausewitzian axiom that, in a war-time break, seemingly easy activities become slow and difficult. Initial battle plans must usually be discarded, and human character becomes as important as intelligence, technology, or strategy.

Being anti-Clausewitzian may not be all bad. After all, the German Armies that executed the brilliant *blitzkrieg* operations of World War II had themselves discarded his advice, insisting on speed and cohesion in

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8. Martin van Creveld, *From Plato to NATO, The History of Command in War Essentially Consists of an Endless Quest for Certainty* (Cambridge MA: Harvard Press, 1985), p.264.

9. Jeffrey Cooper, "The Coherent Battlefield," pp.1-2.

their attack plans. The US military took a similar attitude in the 1991 War against Iraq. Moreover, RMA proponents have their own famous military theorists to invoke for inspiration and validation. Most notable among these are the ancient Chinese strategist Sun Tzu and the 20<sup>th</sup> century British military scholar, B.H. Liddell Hart. Sun Tzu wrote of the desirability of battles avoiding enemy strengths with agility and conception, and winning through savviness and skill rather than brute force. Liddell Hart advocates an “indirect approach” to warfare that emphasises manoeuvre, deception, and above all, the avoidance of a pitched battle against prepared defence. The post-modern battlefield stands to be fundamentally altered by the information revolution at the strategical, operational and tactical ends.

The increasing breadth and depth of the battlefield and the inexorably improving accuracy and destructiveness – and, therefore, lethality – of even conventional munitions, have heightened the importance of C<sup>3</sup>I to the point where dominance in this domain alone may, if exploited properly, yield consistent war-winning advantages.<sup>10</sup> Mastery over satellite technology has enabled man to obtain information from any part of the world to a resolution of up to 3 cm. This means that today nothing is hidden in the world from those who have this technology. All the information gathered in the real-time frame can be processed through computers which today are capable of processing three trillion functions per second. In military affairs, the important thing is the application of process analysis for discrimination of information. This integration of satellite and computer technology has greatly enhanced and facilitated the command and control systems and reduced the time and space dimensions to an extent that it is now real-time information gathering, processing and discrimination. This has been possible due to enormous storage and processing capability which has drastically cut down on rummaging. This enables C<sup>4</sup>ISR (Command, Control, Communication, Computer, Surveillance and Reconnaissance). The application of C<sup>4</sup>ISR is at a much higher level. It connects the strategic level with the tactical level in real-time. Thus, we can also call it a “Revolution in Strategic Affairs”.

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10. Arquilla and Ronfeldt. “Cyber is Coming in an Information-Based Revolution in Military Affairs” (CARAND, 1992), p.12.

This capability of information gathering and processing enabled a US Admiral to present the idea of “creating a web” of ship fighting units in the Indian Ocean and Mediterranean Sea to protect US interest in the pivotal region of the Caspian Sea and the Gulf. This concept of a “web” around the strategic driver with each ship/fighting unit about 100-150 knots apart would enable the commander to identify, acquire, analyse and engage a target anywhere in the area with the most appropriate response. All this process can be completed in the shortest possible time. The response will be so well coordinated and, at the same time, dispersed, that the enemy would be destroyed yet would not be able to know who has done it and from where it has been done. This strategic advantage of coordinating the action from various dispersed locations and remaining hidden is through the satellite/advance communication/computer systems and not by the fighting unit. This is what is called a Revolution in Strategic Affairs.<sup>11</sup>

#### **ECONOMIC CONSEQUENCES OF RMA**

It might appear that adaption of RMA capability is highly expensive, but if a realistic cost-benefit analysis is carried out, it would be found that it is more cost-effective to go in for RMA capability and that is probably the reason why the concept of “Joint Force 2010” became a reality. Generally speaking, RMA makes changes in strategy and reduces the battle space to increase the effectiveness of each fighting unit. Thus, it is more cost-effective. The components of RMA are not military specific—they are used in the civilian sphere as well. It enables the Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C<sup>4</sup>ISR) capable forces to reduce deployment at the operational level. It provides more autonomy to field commanders and establishes a direct link in real-time between strategic and tactical levels through the latest electronic equipment, thus, reducing the cost of unnecessary paper work and intermediary channels. Thereby, the cost of maintaining the forces can be reduced.

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11. Sharjeel Rizwan, file III H: (Revolution/20 in % 20 Military Affairs, 20 (RMA) hts.

**The media can also impart momentum to events, converting these into what are commonly known as tipping events for action through the generation of hype, hope and expectations.**

#### **ENABLING TECHNOLOGIES**

The renowned British strategist, J.F.C. Fuller, argued that with each change in weapon technology, organisations and tactics must also change. Then a determination must also be made to identify the most dominant weapons around which the employment of other weapons must be arranged. It is important to note that it is not necessary for the 'master weapon' to be the decisive weapon on the battlefield. Its qualification for mastery is found in its ability

to immobilise or upset the enemy's tactics and so enable other weapons to be decisively used. In short, it sets the tactical pace.<sup>12</sup> The key to exploiting this revolution in military affairs will be to correctly identify what systems constitutes the "master weapons" in this new era.

#### **POWER OF THE MEDIA**

This emanates from the proliferation of means of transmission to include print television, radio, internal and mobile telephony, commercialisation, financing and professionalisation of the media as an industry. The speed of transmission is imparted by satellite communication and wireless telephony and the forum provided for transmitting varied opinions without being held responsible for the views aired. The media can also impart momentum to events, converting these into what are commonly known as tipping events for action through the generation of hype, hope and expectations. A typical example is the Lahore Summit between Indian Prime Minister Vajpayee and Pakistani Prime Minister Nawaz Sharif held in Lahore in February 1999, reportedly based on momentum imparted by Shekhar Gupta, the Editor of the *Indian Express*. Lack of a foundation to this led to the Kargil conflict, a few months later. In fact, the Kargil conflict was perhaps happening even as the handshake was going on in Lahore.

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12. J.F.C Fuller, "A Study of Mobility in the American Civil War," *Army Quarterly*, January 1935, p.271.

The media can also impact a positive momentum by exploiting the constructive aspects related to peace and development. The ability to integrate psychological operations, public diplomacy and military public affairs into instruments of national policy represents the power of the modern media in the public domain.

In future warfare, the struggle for information will play a central role, taking the place, perhaps, of the struggle for geographical position in earlier conflicts. Information superiority is emerging as a newly recognised, and more intense area of competition. In response to these developments, C<sup>3</sup>I systems must be designed to provide commanders at all levels the information and communications needed to direct the dispersion or concentration of their forces and, more importantly, the weapons effects at the decision point in time and space.

It may now be time to design the command and control systems, firstly, based on the full range of technological possibilities, and then select an individual weapons for acquisition based upon our ability to most effectively integrate them into the C<sup>3</sup>I systems. This is not as far-fetched as it might seem at first. Throughout history, successful military organisations have based their organisation and battlefield formations upon existing command and control technologies. In a sense, it is the soldiers of the modern age who are out of step with history, acquiring weapon systems and platforms based principally on their mechanical capabilities and then improvising a command and control system that barely meets battlefield requirements.<sup>13</sup>

The ability of the major powers to construct and amortise a global information network as the foundation of such a command and control system is the principal source of long-term advantage over potential adversaries.<sup>14</sup> While constructing this system will be expensive, the US has already made much of the necessary research and development investment

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13. Maj. Ralph Peters, USA, "The Moveable Fortress, Warfare in the 21<sup>st</sup> Century," *Military Review*, June 1993, p.66.

14. Cooper, n .9, pp.33-34.

to lay the foundation for future capabilities. Moreover, many of the important components of such a future system (e.g. the global positioning systems, worldwide communication surveillance and reconnaissance platforms, etc.) are already in place. It is this global C<sup>3</sup>I system that will be the master weapon of the 21<sup>st</sup> century. The C<sup>3</sup>I systems by themselves, however, do not fight and win wars. The weapons of tomorrow must be designed to take advantage of the possibilities offered by this global system. In fact, the era of precision-strike weapon systems that require both absolute (latitude and longitude) and relative positioning information (i.e. bearing, range, course and speed) has already arrived.<sup>15</sup>

An important feature of this RMA should be that the supporting technologies are the same as those being rapidly developed in the commercial world. Thus, this revolution can be based on technologies that are also critical for our success and comparative advantage in the global economy. A sound national security investment strategy would focus upon the resources and not only on the acquisition of a small number of large scale arms, global systems, or networks to provide surveillance and targeting information but also inexpensive weapons that can be directed by this system. These investments would provide a significant operational advantage during the short-term, and also on the capability to meet some uncertain security challenges.<sup>16</sup> Needless to add, they would also be cost-effective in the long run.

### **HUMAN FACTOR IN RMA**

The primary impact of the information revolution is to push the envelope of the decision-making speed limit i.e. the speed of thought, to a higher plain. The result of these technological advances will be that the time required to take action on the battlefield will become increasingly limited by the speed at which the 'human in the loop' can make a tactical decision. In the past, decisions were made at a given command level because only that level had the requisite information to make the appropriate decision. But now,

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15. Keaney and Cohen, *Gulf War Air Power Survey*, p.248.

16. Cooper, n.9, pp.40-41.

everyone in the chain of command can have access to the same information at essentially the same time. This has important consequences, both good and bad. Now the President or Prime Minister can select bombing targets in one part of the globe and direct helicopters in another from the control room, or he may sleep through the night while a third target is bombed. A commander now has to know exactly by when to give an order and when to hang up the telephone and let the organisational structure execute the plan he has devised. For action-oriented people, as senior military officers often are, the decision to do nothing is often the hardest to make, which could be a constraint.

### **THE MYTH OF RMA**

RMA has given birth to certain myths in current strategic thinking about wars which need to be addressed. One of the most important is that we can achieve information superiority and even dominance in future conflicts. Even as the "US Joint Vision 2010" plan insisted that we must have information superiority, the information explosion engendered by new technologies may not let any combatant achieve superiority, much less dominance. One reason would be the transformation of the media as it exploits the new technologies. We already know that the media can project powerful images that can build or erode public support for a military operation and can be used as a force multiplier. Historically, however, governments with a mind to do so have been able to exercise significant control over media access to war zones as well as the dispatch of stories from the battlefields. That will seldom be the case in the future. One can envision vertically integrated news organisations with their own surveillance satellites and self-contained communication systems that will allow them to function virtually autonomously. Indeed, one firm, Aero Bureau of Mclean, already can deploy a self-sustaining flying newsroom. The aircraft is equipped not only with multiple, radiant satellite video, audio and data communication links, but also gyro-stabilised cameras, side and forward-looking radars, and, its own pair of camera-equipped remotely piloted vehicles. Information technologies will empower new organisations to such a degree that virtually no significant

**Another myth is that modern technology will make future war bloodless or at least humane.**

observable detail will escape their view, and huge interconnected databases will add tremendously to their data sources. Advanced software, along with a cadre of expert ex-military consultants, will enable them to fuse the raw inputs into useful, real-time or near-real-time reports. With immense amounts of information available from the global media, the

question arises as to what would the need be for future enemies to spend money building extensive intelligence capabilities? In reality, the media will become a “poor man’s intelligence service”. The media’s ability to provide real-time battlefield reports independent of military control will likely create difficulties for casualty-averse democracies.

During the Gulf War of 1989-90, we saw how gruesome photos of the so-called ‘highway of death’ undermined support for continuing the war – and those were pictures of the destruction of a brutal enemy force. What should we expect when the bodies are those of friends and relatives? Tomorrow’s communication capabilities may allow the families of soldiers to establish a virtual presence with them on the battlefield. When live media reports, combined with information from other high-tech sources, begin to communicate the horrific shrieks and terrifying sights of death and mutilation as it happens to a loved one in combat, the political pressure to terminate hostilities at almost any price may become inexorable. In addition to the information disseminated by the news media, information will spill from the proliferating and vulnerable presence of personal cell phones, laptop computers equipped with e-mail and fax machines that troops themselves own and carry with them. This advantage of information will profoundly affect 21<sup>st</sup> century warfare. When we combine these information sources, future adversaries will also be able to buy high resolution commercial satellite products in the open market. Given all these information sources, the goal of seeking information superiority, let alone dominance, on the 21<sup>st</sup> century battlefields is unrealistic.

Another myth is that modern technology will make future war bloodless or at least humane. It has become almost an accepted truth that information

technologies will allow wars to be waged virtually bloodlessly. In a scenario depicted in a *Time* magazine article in 1995, a US Army officer conjured up a future crisis in which someone sitting at a computer terminal in the USA could derail a potential aggressor without firing a single shot. The officer visualised the foe's phone system brought down by a computer virus, logic bombs ravaging the adversary's transportation network, false orders confusing his military, propaganda messages jamming television broadcasts, electronically zeroing out the enemy leaders bank account. All of this is expected to cause the adversary to give up.

Perhaps, this technologically is possible. But, perhaps, technology will have to become inexpensive so that poor nations will be able to afford redundancies that would severely reduce, if not eliminate, the likelihood of success in cyber attacks. We also seem to continually underestimate the ability to devise low-tech ways to circumvent high-tech capabilities. Shouldn't we expect that our targets will plan for precisely this kind of cyber assault? It is also possible that such an enemy might even develop a cell of operators who are equally technologically sophisticated.

Anyway, no one in any future conflict would abandon his cause for such reasons. No one can count on such discomfiture deterring a warrior society or street fighter nation driven by a powerful sociological imperative and acting under the spell of a charismatic leader. In fact, future wars might be more savage. An adversary waging neo-absolutist war could resort to a variety of horrific actions to offset and divert high-tech forces.

What if a country relying on miniaturised communications devices to maintain command and control, deliberately disperse its forces into civilian areas. The intent would be to discourage high-tech attacks by raising fears that there would be a replay of the furore that followed the bombing of the Al-Firdaus bunker during the Gulf War. Precision weapons will be no panacea in a high-tech war. Critical supply facilities as well as those communications nodes that can't be miniaturised and dispersed may be buried below Prisoner of War (POW) camps, schools, hospitals, and similar facilities. Again, the objective would be to deter high-tech attacks by playing on the legal and moral conundrums that would arise, for example, in a

situation where one could destroy an underground ammunition dump only by bombing a hospital above it.

## CONCLUSION

We have to analyse whether war has been affected by the RMA or not. Further, to evaluate the impact of technology on war, we also have to see how technology has affected the objective, efficiency, effectiveness, magnitude and duration of war.

Let us see them one by one. First of all, we have seen that the objectives of war are the same. There is no change on that count. The main objective of war was, and is, the subjugation of nations and occupation of territory in order to obtain the national interest. Secondly, in term of efficiency and effectiveness, there is no revolutionary affect. War is as efficient and effective as it was earlier. Thirdly, the duration of war has been considerably reduced but sometimes has also become irrelevant as in the case of the wars in Afghanistan and Vietnam. Last, but not the least, is the magnitude of war. Previously, it was the case that 70 to 80 percent of a country's population used to take part ( to be involved directly) in war but now it is only 3 to 4 percent, in spite of the increase in population. In fact, technology is only one of the three main factors which affect the battle. These three factors are technology, organisation and concept or strategy. Technology is not the primary determination, but it is the concept that leads to victory or failure. For example, the Mujahideen's successful effort against the Soviets in Afghanistan was a result of this concept. Every new technology was not only neutralised by its antidote but also by the mind of the person using the technology, that is why the concept or strategy at times becomes more important. Take the example of *blitzkrieg* which decreased the importance of the weapon system (a product of technology) and concentrated on the better use of it. This led to a rise in Research and Development (R&D) to find ways and means to use such hardware in a better way to defeat the adversary. If we look through the last 20 years, there is a merger in the field of armour, artillery, infantry, logistic, ships, etc. The only change is in the capability of information gathering and processing.

An interesting thing to note is that when one side has an advantage, RMA is revolutionary and helps to make the strategic environment advantageous. Hence, the one who enjoys the sole advantage in the RMA will enjoy “full spectrum dominance”. Finally, it may be concluded that the RMA cannot and will not transform war into gentle electronic exchanges as some people hope. Video games are certainly not the paradigm of warfare. Wars will continue to be savage and brutal in spite of the advances in the RMA.



# GEO-POLITICAL CHANGES DRIVING CHINA'S AVIATION INDUSTRY

VISHAL NIGAM

The epimorphosis of China's rise as an economic and military power was conceived in a **land of opportunities** which since then has also become instrumental in stimulating the growth and, thus, creating a Frankenstein. The emerging global order is now portrayed by an apparently declining US power and speculation about which amongst the burgeoning nations will eventually rise to power. China, beyond doubt, appears to be emerging as a front runner. Whilst the US economy is expected to grow at a conservative rate as compared to China's thriving economy, sustaining global leadership in the 21<sup>st</sup> century could become a challenge for the Americans as they continue to struggle in a debt-ridden economy serviced by the Chinese. At the same time, a flourishing Chinese economy will naturally make available far greater resources not only for socio-economic benefits but also towards greater allocation on Research and Development (R&D) and improvement in the defence industrial base. Capital and technology inflow from America has played a key role in carrying forward China's policy on reforms. America has more than 60,000 investment projects stationed in China, valued at approximately \$70 billion, while Chinese holdings in the US Treasury alone are in excess of \$1 trillion. Therefore, the two economies are deeply intertwined and, hence, becoming seamlessly interdependent.

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**The key question would, however, be whether realignments and new coalitions would look beyond the 'hub and spoke' system of the Cold War era to maintain a stable balance of power in Asia?**

With the end of the Cold War, the break-up of the Soviet Union and American dominance in the 42-day **Gulf War**, the world witnessed a shift from a bipolar to a unipolar world, and America soon became a central player in geopolitics, with other states virtually in a celestial orbit. However, since the turn of the century, a new concept of multipolarity was brewing to occupy the centre-stage in international politics. The global order was in the cusp of witnessing a gradual shift from a unipolar to a multipolar world, with an apparent shift in power to the

Eastern hemisphere as a consequence of a relatively declining superpower, emerging **Elephant** in the Indian Ocean Region(IOR) and the **Dragon** biding its time to engulf the South China Sea! Like China and Japan which were the two largest growing economies in the last decade of the previous millennium, the new millennium testified to the emergence of 'two rising great powers' in the most active **fault lines** but in the backdrop of immense economic strength. China and India are expected to contribute more than half of the world's economic growth in 2012 in the midst of a fading Europe and America barely managing to achieve positive economic growth but with strong resistance.

Hence, along with the US as an extra-regional power, the two rising indigenous powers are bound to dominate the geo-strategic construct in East Asia. The construct's uniqueness has a resemblance to the Cold War period but with its centre of gravity rooted in the Asia-Pacific. While America will try building partnerships and restoring its influence in a profoundly changing world order, both India and China too will adroitly look for future alliances and partnerships. The key question would, however, be whether realignments and new coalitions would look beyond the 'hub and spoke' system of the Cold War era to maintain a stable balance of power in Asia? And will great powers/emerging great powers take on additional responsibility and ensure that balance is possible before disturbing it?

Or, will inadequate clarity in defining the balance, lead once again to an arms race in the region? Will America's intervention to hug an Asia-Pacific century create further imbalance or restore the balance? Each would try to discard the '**Cold War**' mentality on the pretext of developing strategic alliances within the complexities of regional dynamics. The American presence will, however, redefine the basis of any such framework, and in that context, a future alliance would be founded on real and hard power which will form the bedrock for all coalitions in the region.

**Beijing must owe gratitude to America since China's incredible growth story was paradoxically manufactured in Washington!**

Europe in the new millennium was staring down a '**lost decade**' and overwhelmed by economic opportunities available in Asia and the emerging economies. Asia, during this period, was in the midst of a make-over and the region, apart from experiencing a relative change in the geo-strategic landscape, was also in the middle of a geo-technological revolution driven by economic capacity in the developing countries. Survivability and economic considerations were driving the business plans for major primes located in Europe and America. Most of them were prepared to offset the threat side of the equation – the prime concern being proliferation and reverse engineering. The West was ready to overlook the imperfections in the model and disposed to place their stakes on galloping trade with China, which was now repainting a new map of world prosperity. As a result, China's aerospace industry started moving ahead at an impressive rate, benefitting from increasing participation in the global commercial aerospace market as well as in the supply chains of the leading aerospace companies. The additions accruing to the industry are liable to spin-in benefits into the military aviation sector in the coming decade. It would, therefore, be worthwhile for other players in the region to assess and reconstruct the emerging security threat scenario likely to pan out in the 2025 framework as a consequence of China's growing economic and military prowess and, hence, its impact on the region.

## STRATEGIC BLUNDER

Beijing must owe gratitude to America since *China's incredible growth story* was paradoxically manufactured in Washington! Sino-American trade, at one time considered mutually beneficial, leverages far greater dividends in China's favour today. George Friedman's theory that **"if the United States barred Chinese products, or imposed tariffs that made Chinese goods uncompetitive, China might face a massive economic crisis"** may not be conclusive in the present context because other than economics, there are over six millions jobs tied with the Sino-US trade and at the current rate of unemployment, America can ill-afford to lose these jobs! On the one hand, it is estimated that the US consumers since the turn of the century have saved at least \$60 million every year by buying commodities made in China; the US, on the other hand, has been the biggest source of foreign investment, resulting in huge technology and capital inflow into China. Trade between the US and China has increased from \$ 8 billion in 1985 to \$80 billion at the start of the millennium and a whopping \$447 billion in 2011. The most perceptible change is that the two countries have tried to establish mechanisms for dialogue within fundamental regulations for development. Though the relationship is fraught with friction and divergent views, both countries, significant in size, population, economy and global trade, have set in place stable mechanisms for coping and solving the differences. While the US is China's second largest trading partner, China, on the other hand, is America's third largest export market at \$122 billion, only expected to double by 2014.<sup>1</sup>

America's fascination for China dates back to the 1972, '**Shanghai Communiqué**' drafted by Kissinger and Zhou for Nixon's celebrated visit to China. This was at a time when the two nations had not had diplomatic or trade relations for almost a quarter of a century and America regarded China as part of the Communist bloc and, thus, a target of containment. However, rapprochement was quite clearly part of the American strategy for withdrawing from Vietnam and, at the same time, also playing the

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1. Xinhua Interview, "China and US Have 'Huge Potential for Economic Cooperation: US Expert'", February 6, 2012, as appeared in the FBIS.

China card against the Soviets. From the Chinese standpoint, playing the American card was to balance the Soviets at a time when the country was recovering from the aftermath of the Cultural Revolution and the upheaval in its internal polity. The two sides, however, agreed to disagree on many irreconcilable differences with regard to Taiwan and Vietnam, but neither was prepared to make it a stumbling block in their emerging relationship. The relationship came to a standstill for a few years after the Tiananmen incident. However, in 1991, the Bush Administration once again reengaged China by not only renewing the Most Favoured Nation (MFN) status but also advocating a policy of constructive engagement, later also carried forward by Obama, thereby reiterating China's inclusion in the new global order and spelling out that both countries have common interests in the Asia-Pacific region. The overtures were highlighted in the statement that, "*the United States and China have an increasingly broad base of cooperation and share increasingly important common responsibilities on many major issues concerning global stability and prosperity*" and also that the US welcomes a *strong, prosperous and successful China that plays a greater role in world affairs*, thereby accepting China as a major world power in the 21<sup>st</sup> century. While China has elegantly manoeuvred itself as an emerging great power in the new global order, one cannot help but acknowledge Washington's prodigious role in providing soul to *China's incredible rise in the last three decades!*

Was it a strategic blunder on the part of America to actively engage China in 1991 when the world was transiting from a bipolar to a unipolar world order, with China extremely heedful at that time of its exclusion from the new order? While, on the one hand, America's restlessness to tango with China then was understandable, in hindsight would it be accurate to suggest that it was a costly miscalculation and a '**strategic blunder**' which resulted in creating a '**Frankenstein**' for the world today! Is America once again repeating the same mistake in this time making a shift from the European democracies which have been its cornerstone in engagement with the world, to hug an Asia-Pacific in the 21<sup>st</sup> century? Are these strategies a compulsion driven by necessity to restore the dwindling American and European economies and secure interests in a profoundly changing world, or

**A number of People's Liberation Army Air Force (PLAAF) officers were being trained in combat readiness, bombing and strafing operations at the Edward Air Force Base in 1999.**

to indicate America's continuing military primacy despite the slicing of billions from the Pentagon's budget? A strategy which could resonate well with the voters in 2012 to demonstrate that America continues to hold a position of military superiority over great as well as emerging great powers. What could be the compelling reasons for America's resolute urge to taste the waters of the South China Sea and the Indian Ocean and destabilise the already unstable tectonic plates in the region? This comes at a time when both the

US and China have stressed on building a sound and stable relationship based on mutual respect and benefit, as stated by Hu Jintao in 2010 and reiterated by Vice Chairman of the Central Military Commission (CMC) and President designate, Xi Jinping. Hence, is '**back in Asia**' and '**trans-Pacific strategic economic partnership**', a larger strategy to manipulate the strategic landscape in the region through new alliances to benefit China and America and if so, where should India position itself in the emerging global order?

America's engagement with China in the past has not been limited to building economic relations but also involves developing a proxy military partnership, as revealed by some declassified documents as a consequence of the Freedom of Information Act (FOIA) 2002. It is now out in the open that *de-facto* military training was being conducted in the garb of a civil airline modernisation programme in the '**friendly skies of America**'. A number of People's Liberation Army Air Force (PLAAF) officers were being trained in **combat readiness, bombing and strafing** operations at the Edward Air Force Base in 1999. The documents further revealed that most of these exchange visits were sponsored by the Federal Aviation Administration (FAA) to conceal the military component of the delegation and that this kind of training had been going on since the time of the Clinton Administration in 1993.<sup>2</sup> The meetings continued even in the aftermath

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2. <http://www.softwar.net/plaafaa.html>, accessed on January 31, 2012.

of the EP-3 bombing in 2001, where the two sides apparently discussed possible US military assistance in terms of equipment and training for Air Traffic Control (ATC) and logistics support in China.<sup>3</sup> In 2009, the United States and China agreed to further strengthen cooperation on civil aviation, and confirmed their intent to expand the Memorandum of Understanding for Technical Cooperation in the field of civil aviation between the FAA and the Civil Aviation Administration of China (CAAC).<sup>4</sup> In the last 25 years, other than trade, interactions through mutual visits have increased from 10,000 to over three million every year.<sup>5</sup> While, on the one hand, the US was engaging China militarily as well as economically, in its very own inimitable style, it did not shy away from admonishing Israel for assisting the Chinese through the Lavi programme in the mid-1990s. Hence, it is quite obvious that China's incredible growth story has indeed been scripted in the back channels of America.

### STRATEGIC CONSTRUCT

It seems quite clear that the future strategic construct will inherently lie in the realm of Asia consisting of India, China and the US as an extra-regional power. The India-China stand-off appears to be most unlikely in the next decade or two, but in case of an unexpected eventuality, what would be America's posture and thereafter the implications for the region? How different would be America's reaction to a potential Sino-India conflict in a 2020 framework compared to a 2030 framework? On the other hand, if one was to visualise a diametrically opposite construct of a Sino-India convergence in the midst of the US strategy to hug the Asia-Pacific, how would America re-strategise and justify its presence in the region? And, finally, the most expected case of a US-Iran stand-off: what would be the

3. <http://www.softwar.net/plaaf2.html> and an article written by Charles R. Smith on October 3, 2001 which appeared on <http://archive.newsmax.com/archives/articles/2001/10/3/92605.shtml>, accessed on January 31, 2012.
4. US-China Joint Statement, Beijing, China, released on November 17, 2012, by Office of the Press Secretary, White House, <http://www.whitehouse.gov/the-press-office/us-china-joint-statement>, accessed on February 1, 2012.
5. Li Xingpin's interview to *Washington Post* during his visit to America as a state guest of US Vice President on February 13, 2012 and appeared in <http://english.peopledaily.com.cn/90883/7728221.html>, accessed on February 14, 2012.

likely positions of India and China in the entire dynamics and the changing strategic landscape in the region? Whilst according to many realists, the US could be trying to rebalance its presence in Asia through new alliances and coalitions to restore its strength, the larger point still remains that if the equilibrium is not well managed, the region could very easily slip into a potential conflict. While the Shanghai communiqué changed the dynamics in the Cold War era, America's shift to the Asia-Pacific could well alter the dynamics in the post Cold War era and create major fault lines in the region. Is the movement a signal pointing towards an end to today's wars and the beginning of future wars? Is America's focus on the Asia-Pacific an indiscretion of the times, a strategy of limited intervention when it appears to be suffering from war weariness and in the midst of a financial crisis, with tremendous pressure to cut down its defence expenditure? Lastly, if America is only seeking to maximise opportunities which now lie in Asia, why cannot India, China and other countries in the region look to maximise the same opportunities available in their backyard? Hence, are the new and emerging fault lines a result of a combination of economics and politics defining future opportunities?

### **SHIFTING FAULT LINES**

Huntington in his book *Clash of Civilizations and the Remaking of World Order* argued, "*The clash of civilizations will dominate global politics. The fault lines between civilizations would be the future battlefields*" and predicted that World War III would stem from the clash of civilisations! He also said that culture and cultural identity, which at the broadest level comprise civilisational identity, are shaping patterns of cohesion, disintegration and conflict, and inter-civilisation issues are broadly replacing the earlier inter-superpower issues in the post Cold War era. However, the emergence of an economically dynamic region in the East, hungry for technology, was fast becoming the cornerstone for a new world order. And in the context of a new and evolving global order, Huntington's hypothesis will necessarily have to be extended to also include economics-technology-resources in defining fault lines in the decades ahead.

All these factors would then become a larger construct for civilisational identity and also drivers to restructure the emerging new global order in a multipolar world. The causes of conflict may not only be limited to divergent values, ideas, culture and identity but also a result of knock-back for technology or for that matter resources in the emerging global order, all likely to have an impact in defining future fault lines. The hunger for resources will continue to drive nations into conflict zones, particularly so because of changing economics, geo-politics and strategic priorities. China, which used to be self-sufficient, has grown to outstrip its own resources and become a net importer like Japan! It is also the largest economy in Asia, second only to America, and a majority of its energy resources transit through the IOR, Malacca and the South China Sea. The IOR and South China Sea, host to two indigenous rising great powers and an arena for the extra-regional great power, have the immense potential to qualify as a potent fault line in the 21<sup>st</sup> century. While the region would continue to be a strategic challenge for some powers, it would also be a bed of opportunities for others and, in that context, the IOR could play a key role as a potent choke point for access to the Persian Gulf, Europe and Africa. While China, on the one hand, is taking bold initiatives to develop military options to counter the choke points, India, on the other, would also develop military capabilities to counter China's military build-up, thereby making the region yet another arena for the arms race in the 21<sup>st</sup> century. In the new world order, it is abundantly clear that no country, whether a superpower or an emerging great power, can afford the arrogance of believing it is immune to dangers and, therefore, the requirement of credible military power will continue to guide the strategic options in the region.

**It aims to expand interaction with the international community to pursue its key national security objectives as against the earlier ideological baggage of merely pursuing the Party agenda.**

#### **TECHNOLOGY TRENDS**

China's foreign policy is complemented with a forward looking military-

diplomacy trying to shape the international security environment in the realm of *real politik*. It aims to expand interaction with the international community to pursue its key national security objectives as against the earlier ideological baggage of merely pursuing the Party agenda. The increase in defence spending also creates a perception amongst its Asia-Pacific neighbours that Beijing is becoming increasingly aggressive and hostile in its foreign policy. Opacity in military estimates complemented with the *IHS Jane's* analysis that China's military expenditure could reach a colossal \$238 billion by 2015 only increases the fog and growing insecurities which could have serious security implications for the Asia-Pacific.<sup>6</sup> However, the key security objectives that China is strategising to follow in the coming years and decades are first, modernising the state and its defence; second, acquiring technology; third, defending its sovereignty in its core area of interest; and fourth, securing itself with adequate reserves of resources and preparing for future challenges, irrespective of the adversary.

China's quest to take on the strongest and most potent adversary in the region has resulted in an accelerated modernisation drive. It is using all the resources at its disposal through both state and military diplomacy to gain access to technology for modernising its strategic industries. China is also leveraging strategic gains by providing military assistance through arms sales to countries where it could have key strategic interests. The deepening reforms and socio-economic changes are resulting in young officers acquiring knowledge on modern military concepts, training, administration and a host of other non-operational and combat related areas through international exchanges. The open door state policy, based on mutual beneficial cooperation, and the state's investment in R&D and infrastructure has only added impetus to China's rise as a modern state and its quest for technology in the second and third decades of the 21<sup>st</sup> century. The debate on technology transfer has also undergone a paradigm shift since the second half of the 20<sup>th</sup> century to the present time, as we step into the second decade of the 21<sup>st</sup> century, and it would be foolhardy for a developed

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6. [http://news.xinhuanet.com/english/china/2012-02/21/c\\_131421249.htm](http://news.xinhuanet.com/english/china/2012-02/21/c_131421249.htm) and [english.peoplesdaily.com.cn/90786/7734706.html](http://english.peoplesdaily.com.cn/90786/7734706.html), accessed on February 22, 2012.

country to expect a developing country of reasonable stature to get excited by limited technology transfer through licensed manufacturing.

It cannot be denied that initiatives by the middle income developing countries in accepting cultural assimilation and social restructuring have only added impetus for creating an environment for successful transfer of technology, and countries lagging behind in this initiative would have to forego opportunities. Steps in this direction have resulted in an increase in the numbers of trained scientists and technologists residing in some of these countries, enhancing the magnitude of scientific research and adding momentum for creating a favourable environment for technology transfer. The trend is also driven by capacity and growth and, therefore, some of these nations are aspiring for a much larger share of the pie. The role of the state has also bolstered progress in some countries like China and Brazil by increasing allocation on R&D and outlays in developing infrastructure, but not as much in India. The world is, however, appearing to be getting seamlessly interconnected as well as interdependent and the concept of free trade has percolated to such an extent that industries dealing in specialisation of component and finished products favour production facilities that serve more than one nation to derive advantage from skills inherent in the countries. The strategy rooted in the developed nations is bound to create opportunities for some emerging economies enjoying the advantage of capacity, trained manpower and economic growth, with a propensity to attract and set up manufacturing hubs and boost **'localisation'**. The industries in these developing countries will eventually become **'home markets'**<sup>7</sup> and a critical part in the global supply chain. On the one hand, synergy would help home markets improve financial management, incorporate better management ethics, reduce qualitative gaps and barriers for indigenous development; while, on the other, industries based in the developed countries would benefit from enhanced production capacities leading to economies of scale and cost advantage.

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7. The home market is a major domestic sales market set up in a country to benefit from returns to scale and transportation costs since most of its products are consumed in the country. A home market can also become a global manufacturing hub due to cost advantages vested in the country. The concept was, however, first theorised by Paul R. Krugman in his article, "Scale Economies, Product Differentiation, and Pattern of Trade."

**Embracing technology by carrying out changes in the internal politico and socio-economic structure could be one end of the spectrum in the strategy.**

It may be important to also understand the technological dynamics in the neo-liberal and neo-realist paradigm; at the same time, it is equally important to value it in the changing framework of the strategic and economic landscape of the evolving new global order. While *dependency theory* could form one part of the complex equation, emphasis on balance of power in the region could form the other part in the transfer of technology equation. Technologies in the denial list are universally controlled by the state and regarded as a zero-sum game driven by the concerns of proliferation and competition and, therefore, could be applied in the neo-liberal framework of the dependency theory. The private industries and businesses, on the other hand, appear more pragmatic in their philosophy of operating in a seamless and efficient environment, with concerns driven by economic benefits, irrespective of the direction of flow of knowledge. Hence, today, it could be conclusive to mention that absorption of technology outside the denial regime fundamentally boils down to embracing changes in the cultural paradigms and flow of knowledge as a consequence of globalisation, free trade and localisation. Availability of a broad range of scientific and technological skills, skilled manpower and adequate infrastructure in a home market cannot be ignored for application of technology developed elsewhere.

At the same time, emerging powers in the midst of a technology dilemma are being driven by the nationalistic approach in the quest for technological autarky. However, if some of these nations want to embrace technology and participate in the economics of geotechnology, they will have to strategise by enforcing social restructuring and creating a culture to invigorate innovation. Embracing technology by carrying out changes in the internal politico and socio-economic structure could be one end of the spectrum in the strategy; illegally acquiring technology with scant regard for intellectual property could form the other side of the spectrum. Hence, lifting the European Union's arms embargo on China, in the midst of the prevailing

economic crisis would be a good way to suck up to the Chinese and see the *European weapons* of today become the *Chinese weapons* of tomorrow!<sup>8</sup> Though protection of intellectual property is guaranteed in the World Trade Organisation (WTO) agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), these agreements, more often than not, appear to be binding only for a few disciplined nations. Rogue nations, however, will continue to filch technology, defy intellectual property rights and carry out proliferation for strategic gains.

**China's military is a growing threat in the Asia-Pacific and if not balanced strategically, could end up becoming another flashpoint in the region.**

China's economy has been growing at an unprecedented rate coupled with military modernisation, despite being in the midst of a technology dilemma. The hunger for resources is driving Beijing's urge to acquire technology at any cost. China's military is a growing threat in the Asia-Pacific and if not balanced strategically, could end up becoming another flashpoint in the region. China annihilated a satellite in 2007, conducted an anti-missile test shortly after America announced arms sales to Taiwan and constructed a massive subterranean naval base in Hainan to launch extended naval operations in the Pacific. It 'invisibly' flew the J-20 in 2011, coinciding with Robert Gates' visit and so stealthy was the aircraft that Hu Jintao too was taken by surprise! The Chinese have also launched a series of satellites for navigation: the Tiangong-1 was launched on-board the Long March 2F rocket from the Jiuquan Satellite Launch Centre, marking the first step to establish a manned space station by 2020. China's navy too is on a long march even though it may not possess the capacity or capabilities to prowl the world's oceans like the Soviets in the Cold War era. However, it is trying hard to project power beyond its land territory to patrol farther from its home waters. China has sent 10 groups consisting of 25 warships to escort over 4,500 Chinese and foreign ships across the Gulf of Aden since 2008; it recently

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8. Discussions with Air Cmde Jasjit Singh, Director CAPS, in the conference room, on February 29, 2012.

commissioned a hospital ship, *Peace Ark*, which cruised across the globe. It is building a new icebreaker for polar expeditions since it fears that environmental changes in the Arctic are bound to have a direct impact on China. At the same time, it is also strategising to acquire overseas basing rights to station forces abroad.

China is an emerging power in the new global order, with the centre of gravity lying in the Asia-Pacific. Though it may still not be prepared to challenge the best, it is hoping to fast transcend from being a regional power to achieve its global military as well as strategic aspirations. Many analysts and policy-makers have expressed that China could, in the future, threaten America's ability to project power, and Adm Robert Willard, head of the US Pacific Command, was most alarmist of them all. He mentioned that in the past decade or more, China has exceeded most of America's intelligence estimates of its military capabilities. However optimistic the aspirations and predictions regarding China's future military capabilities may appear, the aspirations will have to be backed with availability of critical and modern technology in China's backyard, and in that context, China appears to be deficient.

Hence, if China's pursuit for technology gains momentum, Beijing may not hesitate to walk the extra yard to grab technology before engaging in the art of proliferation for strategic gains – an area in which it has excelled in the past! The second and third decades of this millennium will be characterised by the desire for technology acquisition by middle income developing nations. It will, therefore, be technology and economics and not ideology alone which will become critical in polarising the world and, in that context, the geo-politics of the past will transcend to the geo-technology of tomorrow. Will the dynamics of the forces between nations, driven by a multitude of factors, permit technology to be perceived as a zero-sum game? And if technology continues to be perceived as a zero-sum game in the future, would it become another contributor to drive the region into a conflict zone, thereby creating yet another fault line which could destabilise the already disturbed tectonic plates in the region?

## **FUTURE TRENDS**

George Friedman in *The State of the World: Explaining US Strategy* has mentioned that the world order of 2012 was different, conspicuous by the absence of China, Europe and Russia of the 1990s.<sup>9</sup> The last decade of the previous century was an absolute disaster for Russia; Europe, on the other hand, was surviving in the difficult times of post 2008 financial crisis. India and China were the only two countries which continued to grow at an unprecedented rate of more than 8 percent at a time when global economic growth was estimated to be a modest 2.6 percent, with America growing at barely 2 percent and Japan and European Union struggling to recover from recession mode.

Riding on a robust economy, China started to focus on strategic modernisation to meet the requirements of 21<sup>st</sup> century warfare at a time when its conventional forces were despairingly inadequate in both quality and performance. It, therefore, started spending billions of dollars on modernising its air, naval and ground forces along with space, information and missiles to first challenge the best in the region and then outside of it. Since the turn of the century, the budgetary allocation had increased five-fold to \$100 billion in 2011, which further stirred up the belief that the dragon was becoming a dangerous threat in the region. The enormous increase in the year on year allocations in defence expenditure highlighted Beijing's concern to defend itself against foreign aggression and catch up with the West. China's ultimate dilemma was postured on the belief of an American blockade in the region extending from the Strait Malacca to the Strait of Hormuz.

In the 1980s, Deng proposed to reform and build a capable military but on the foundation of a strong economy. However, barely a decade after he initiated the reforms, the sound of the Patriots, the overwhelming visuals of mean machines flying across the Iraqi skies, armed with smart bombs, became not only a 'cultural shock' but also a loud wake-up call, which the Chinese feared could pose a challenge in their pursuit of national security.

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9. George Friedman, "State of the World : Explaining US Strategy," *STRATFOR*, February 28, 2012.

**Hence, the way forward was embracing innovation through indigenous R&D which was becoming the central theme for leaders and members of the scientific community, and by integrating civil and military.**

The theatrics in the 42-day 'Gulf War' became a real-time technology demonstrator for future war-fighting capabilities to lay bare how an inferior force could be easily annihilated by a superior one. Hence, the strategists within the PLA started reformulating doctrines, cutting down the size of their forces, and sought to acquire new technologies that would enable them to catch up with the West. Many scholars and think-tanks started to read and write volumes on the Gulf War and one such document that caught the eye was *Unrestricted Warfare*. China, therefore, started to flex its political and military clout in pursuit of foreign technology and set up a vision to catch up with West by the first quarter, and rub shoulders with the best by the middle of the 21<sup>st</sup> century.

China's progress in defence economy has been somewhat impressive since it embarked on reforms in the late 1990s. Linkages with global production and innovation networks of major primes from the West have provided impetus to the aviation industry. Growth in the sector can be gauged through an array of indicators like education standards, network of state level science and technology laboratories, institutional capacity to elevate science to technology, improvement in research and development along with indigenous innovation capabilities and also increase in corporate profitability.<sup>10</sup> The Aviation Industry of China (AVIC) spearheaded reforms in the defence economy. In 2003, AVIC, for the first time, started reflecting a healthy balance sheet with positive working capital which soared to \$1.4 billion in 2009.

While the aviation industry was progressing at a brisk pace, the Chinese planners were almost certain that they would encounter strong resistance in acquiring foreign technology for the military aircraft industry. Hence, the

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10. Discussions with Tai Ming Cheung during his visit to New Delhi on February 3-4, 2012. Tai Ming Cheung is the author of *Fortifying China: The Struggle to Build a Modern Defence Economy* and works at the University of California Institute on Global Conflict and Cooperation/ University of California San Diego, USA.

way forward was embracing innovation through indigenous R&D which was becoming the central theme for leaders and members of the scientific community, and by integrating civil and military in such a way that a majority of the military technological requirements could be incrementally met through spin-ins. As a result, China started investing huge amounts of capital in the 11<sup>th</sup> and 12<sup>th</sup> Plans towards development of domestic jumbo jets – the ARJ-21 and C-919. It was expected that in the next decade, the demand for the Airbus and Boeing class jets would soar to more than 4,000 aircraft. At the same time, while the indigenously manufactured home grown aircraft would augment the demand, it would also help generate flow of knowledge, develop infrastructure and capabilities to eventually spin-in civil technology to the military aviation industry. It is almost a foregone conclusion that the future growth story of the global aviation industry is likely to lie in the realm of China, which is expected to represent a major source of demand and presumably grow exponentially in the coming decades. It would, therefore, be advantageous for the home markets to become part of the global supply chain in the aviation industry. This dynamics will become inevitable as the Western primes will have no choice in the present economic environment but to head for China for sourcing requirements due to the cost advantage; and, from China's perspective, it is bound to be a good business proposition by taking advantage of inflows of foreign technologies, human resources and capital, know-how, finer management practices and market competition. At the end, all the factors put together will substantially contribute towards the development of a full grown military aviation industry with cutting edge technology, if not by the first quarter then at least by the first half of the 21<sup>st</sup> century.



# DECODING CYBER TERRORISM: TOWARDS A CULTURE OF INTERNATIONAL CO-OPERATION

M.K. SHARMA

The collective consciousness of the global society today has risen to a level wherein nation-states want to be seen as rational. As the large destructive power of nuclear weapons and conventional weapons makes their use on a large scale almost impossible, War By Other Means (WBOM), and cyber warfare are seen as more benevolent yet effective tools of exercising power in this age. Cyber warfare, in many ways is the smartest way of realising the famous saying of Sun Tzu “A victorious army first wins, and then seeks battle, a defeated army first battles then seeks victory”.

While it may be true that technology permeates war but does not govern it, one must appreciate that it is not the technology per-se, but how it is organised that shapes what kinds of threats we would face in the future. The world today is faced with a newer and more potent threat called terrorism, which, when fuelled by information technological innovations, is called cyber terrorism.

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**Exploitation of cyber space is becoming easier each passing day mainly due to the inherent anonymity attached to it.**

**AIM**

This paper addresses the dynamics of cyber terrorism as a threat to the National Critical Information Infrastructure (NCII) and how the international community, regulatory and legal systems should respond to this increasingly potent security threat to nation-states.

**SCOPE**

The scope of this paper is to understand cyber terrorism tools that could be used against a nation-state's critical information infrastructure while deliberating on how different nations look at NCII, with the help of a survey of ten countries. The paper intends to bring forth the concept of 'Cyber Centres of Gravity' as a new way of looking at NCII. 'Offence, Defence and Deterrence Dynamics' as a counter-cyber terrorism strategy has been discussed, with focus on the contrast of economic efforts involved in creating cyber defences for NCII vis-a-vis cyber offensive tools available in the hands of terrorists. The paper also discusses the different ways in which the internet is being leveraged by cyber terrorists and the role the international community can play in securing cyber space.

**CYBER WAR-MAKING TOOLS**

Exploitation of cyber space is becoming easier each passing day mainly due to the inherent anonymity attached to it. In fact, one of the major factors responsible for the rising vulnerabilities in cyber space is the rising sophistication in hacker tools that has come of age from mere password guessing ability and self-replicating codes in the 1980s, to password cracking, exploiting known vulnerabilities, back doors and disabling audits in the 1990s and gaining new heights of sophistication with techniques like sweepers, sniffers, hijacking sensors, stealth diagnostics and packet forging or spoofing today. This has resulted in the availability of phenomenally powerful hacking tools with a simultaneous sharp drop in the technical knowledge required to use them.

## CONCEPT OF NATIONAL CRITICAL INFORMATION INFRASTRUCTURE (NCII)

An analysis of the most frequently mentioned critical sectors in various countries indicates that there are fifteen core sectors of modern societies, that are possibly the areas where a large-scale interruption would be most devastating. A “critically important part of the information infrastructure” as defined in UN Resolution A/RES/65/41 is “a part (element) of an information infrastructure, actions against which could have consequences directly connected to national security, including the security of individuals, society, and the government”.

Over a period of time, the concept of criticality has also undergone change, and the criteria for determining infrastructures that qualify as critical have expanded over time. The President’s Commission on Critical Infrastructure (PCCIP) of the US, for example, defined eight sectors as critical for the US initially; however, today, there are more than 18 critical infrastructures in the US today.<sup>1</sup> There are mainly two interrelated perceptions of viewing criticality by the nation-states:<sup>2</sup>

**Criticality as a Systemic Concept:** This approach assumes that an infrastructure or an infrastructure component is critical due to its structural position in the whole system of infrastructures, especially when it constitutes an important link between other infrastructures or sectors, and thus, reinforces interdependencies.

**Criticality as a Symbolic Concept:** This approach assumes that an infrastructure or an infrastructure component is inherently critical because of its role or function in society; the issue of interdependency is secondary – the inherent symbolic meaning of certain infrastructures is enough to make

**Over a period of time, the concept of criticality has also undergone change, and the criteria for determining infrastructures that qualify as critical have expanded over time.**

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1. CIIP Handbooks 2002, 2004, and 2006

2. Metzger, “The Concept of Critical Infrastructure Protection (CIP)” in A. J. K. Bailes, and Isabelle Frommelt, eds., *Business and Security: Public-Private Sector Relationships in a New Security Environment* (Oxford: Oxford University Press), pp. 197–209.

them interesting targets.<sup>3</sup>

The symbolic understanding of criticality allows the integration of non-interdependent infrastructures as well as objects that are not man-made into the concept of critical infrastructures, including significant personalities or natural and historical sites with a strong symbolic character. Additionally, the symbolic approach allows essential assets to be defined more easily than the systemic one, because in a socio-political context, the defining element is not interdependency as such, but the role, relevance, and symbolic value of specific infrastructures.

**Table 1: Overview of Critical Sectors and Sub-Sectors Identified by Surveyed Countries.<sup>4</sup>**

Country Specific Critical Sectors	US	IND	GER	CAN	JAP	RUS	UK	MAL	EST	AUS
Banking and Finance	*	*	*	*	*	*	*	*	*	*
Central Government /Govt. Services	*		*	*	*	*	*	*	*	
Chemical and Nuclear Industry	*	*		*				*		
Emergency / Rescue Services	*	*		*		*	*	*	*	*
Energy / Electricity	*	*	*	*	*		*		*	*
Food / Agriculture	*		*	*	*		*		*	*
Health Services	*			*			*	*	*	*
Information Services / Media	*					*				*

3. Critical Assessment Without Interdependencies: United States General Accounting Office (GAO). Testimony before the Subcommittee on National Security, Veterans Affairs, and International Relations; House Committee on Government Reform. "Homeland Security: Key Elements of a Risk Management". Statement of Raymond J. Decker, Director, Defence Capabilities and Management, October 12, 2001, p. 6. <http://www.gao.gov/new.items/d02150t.pdf>, accessed in June 2008.

4. Andreas Wenger, Victor Mauer and Myriam Dunn Cavelty, *International CIIP Handbook 2008 / 2009*, pp.530-531.

Military Defence / Defence Facilities	*	*				*	*	*		
National Icons and Monuments	*									*
Sewerage / Waste Management	*						*	*		*
Telecommunications	*	*	*	*	*	*	*		*	*
Transportation Logistics	*	*	*	*	*		*	*	*	*
Water Infrastructure	*								*	
Water (Supply)	*		*		*		*	*	*	*

**Survey Findings on Approaches to NCII:** Different countries view criticality differently. In some countries, Critical Information Infrastructure Protection (CIIP) efforts are mainly led by the defence establishment, whereas in other countries, such as the UK, the efforts towards CIIP are jointly led by the business community and public agencies. Furthermore, in Australia as well as in the US, CIIP is integrated into the overall counter-terrorism efforts, where the intelligence community plays an important role. In India, Korea, and Japan, the fostering of the information society and economic growth through safe information infrastructures is at the forefront.

It is evident from the ongoing analysis that current methodologies for identifying Critical Information Infrastructure (CII) are insufficient in a number of ways. One of the major shortcomings is that the majority of nation-states fail to address the issue of interdependencies and possible cascading effects. Besides, the available methods are either too sector-specific or too focussed on a single infrastructure and do not take into account the strategic, security-related, and economic importance of CII.

Presently, India has adopted the US (PCIIP) way of identifying NCII which is based on almost a one-to-one mapping between infrastructures identified as critical and the members of the commission. This approach

may altogether omit some critical infrastructure from the list just because it did not fall in the area of their expertise.<sup>5</sup> How can we ensure that the list is complete and the most critical infrastructures are identified? Therefore, a different approach based on scientific methods such as modelling and simulation techniques for identifying CII is required. This could be approached either on the basis of 'minimum flow' or be 'economic-based'.

**Minimum Flow-Based Approach to NCII:** Survival of any system, civil or military, would depend on flow of data (in turn, flow of deliverables, goods through the distribution network). Any type of attack (bombs or sabotage) which is likely to disable some nodes will not necessarily cripple the system. Through modelling, we can arrive at some minimum data flow rate for any system below which it would become mission critical. This approach is different from the other approaches such as intrusion detection, which are limited to computer security. The minimum flow-based approach analyses the damage that the enemy can cause to the critical infrastructure if he succeeds in an attack. This would help build the optimum redundant flow models, making it hard for the enemy (insider and outsider both) to choose an optimal winning strategy.

During World War II, a PERT digraph of the then mechanical model showed ball bearings as the most critical component in the war-making industry, as removing this single node could affect several outputs such as manufacturing of tanks, aircraft, trucks, cars, etc. Therefore, targeting, Nazi Germany's factories involved in making ball bearings by bombing campaigns proved to be decisive.

**An Economic-Based Approach to NCII:** This approach takes into account what an enemy can attack. For any attack, there is a corresponding cost involved (in terms of the enemy's budget or the free time the hacker has got, etc). Say the enemy will be able to take over a set of nodes and edges within its budget. However, the factors affecting the enemy's potential are not necessarily related linearly like the enemy's capability for a given budget will come down drastically if so many different operating systems are in use.

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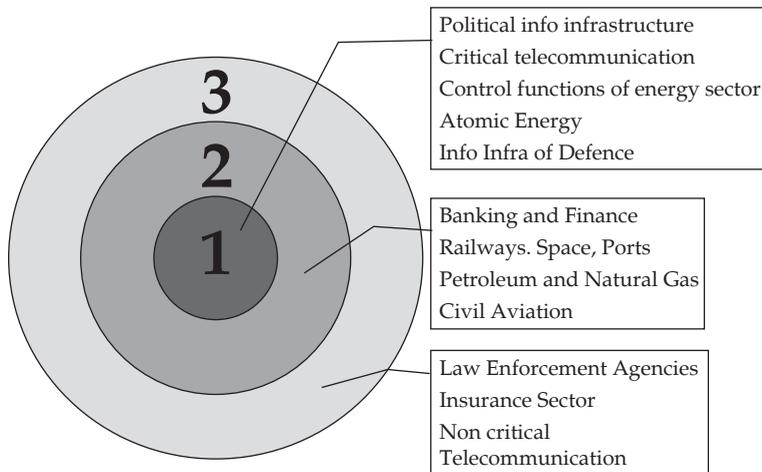
5. The food distribution and production industry was one of the many critical infrastructures that was not included, which later got included in the list of the President's National Strategy for Homeland Security, <http://www.ciao.gov/publicaffairs/qsandas.htm>.

Also the combined effect of the degradation of multiple essential systems just above critical values would need development of more comprehensive models based on approximation techniques to improve predictability of critical infrastructures' survivability.

To identify which infrastructures are truly the most critical, more refined alternative models will have to be developed, taking into account the dynamic aspect of our society. The time aspect would have to be included in the models. This would enable us to deal with buffers and recovery, which are time critical processes. Another point to be taken care of while developing the model is that all the damaged nodes are not necessarily destroyed. In a flow model, a damaged node may correspond to reduced flow or incorrect flow, resulting in a faulty product from a factory, having ripple effects.

### CYBER CENTRES OF GRAVITY

Fig 1: Cyber Centres of Gravity



India's NCII as defined are banking and finance, insurance, civil aviation, telecommunications, atomic energy, power, ports, railways, space, petroleum and natural gas, defence, law enforcement agencies. All national

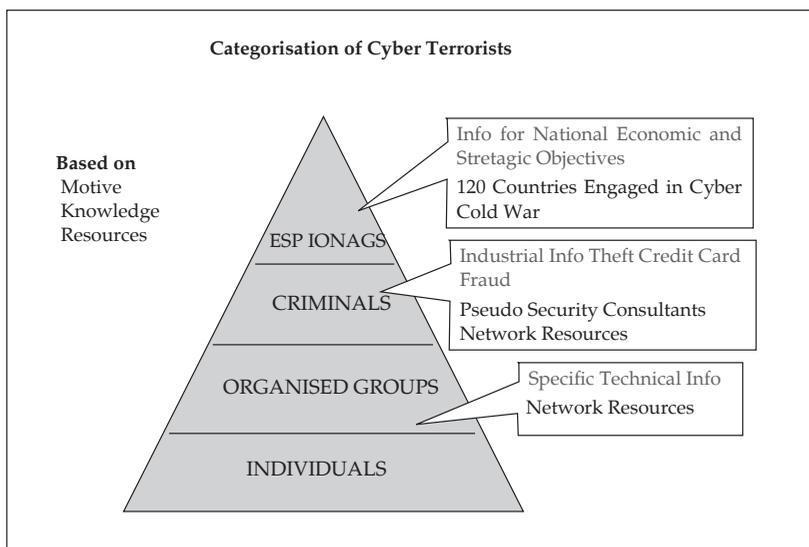
cyber assets could be grouped on the basis of centres of gravity for national security (say, in a three tier arrangement).

The innermost cyber centre of gravity would consist of those components of NCII that are critical to national security and sustaining human life such as: political information infrastructure, critical telecommunication sector, control functions of the energy sector and information infrastructure of the defence sector, etc. This must be made as robust as possible. The next centre of gravity would consist of those cyber assets which are important to the country's economy even if they are not likely to cause physical harm such as banking and finance, railways, space, ports, petroleum and natural gas, atomic energy and civil aviation, etc.

The third tier, the outermost centre of gravity, would consist of systems whose disruption would cause considerable personal inconvenience or economic loss but would not present a threat to the existence of the society as a whole, such as law enforcement agencies, the insurance sector and the non-critical telecommunication sector, etc.

## CATEGORIES OF CYBER INTRUDERS

**Fig 2: Categorisation of Cyber Intruders**



There are different categories of intruders based on their motive, knowledge level and the resources at their disposal. 'Individual intruders' are generally motivated by thrill, or challenge without any strategic planning e.g. Gary McKinnon of north London is accused of committing the "biggest military computer hack of all times", on the Pentagon and National Aeronautics and Space Agency (NASA) systems and the cost of repairing the shutdown was \$70 million dollars.

There are 'organised groups' with the common goal of getting access to specific information like proprietary technical information of credit reports, etc. The 'criminals category' of intruders is growing at the highest rate, motivated to gain unauthorised access to systems for monetary profit or unfair market share. They are involved in wire transfer theft, industrial espionage, credit card theft, or become pseudo security consultants. It is believed that the development of the Tupolev Tu-144 supersonic aircraft, with its rapid design similarity to Concorde, was one of the most prominent examples of industrial espionage in the 20<sup>th</sup> century.

The 'espionage category' of intrusions has the greatest variety and complexity of methods and resources. Often, the resources available (equipment, manpower and technical knowledge) are limited only by cost versus the potential gain, and many a times these are sponsored by state and non-state actors. With the primary motive of access to systems or information for national, economic or strategic objectives—this category has direct national security ramifications.

To be prepared for the worst, we have to assess the potential damage by the worst kind of intrusion 'espionage' on our innermost cyber centre of gravity. And this requires further in-depth model-based research.

**Investments in cyber defence have a diminishing marginal return per rupee spent on security.**

**Extrapolating from it, the larger the attack, the less cost-effective the defence is in preventing harmful effects.**

**OFFENCE-DEFENCE AND DETERRENCE DYNAMICS**

Investments in cyber defence have a diminishing marginal return per rupee spent on security. Extrapolating from it, the larger the attack, the less cost-effective the defence is in preventing harmful effects. The diminishing returns on investment in defence relative to offence are especially conspicuous when considering the disparity between “hacking” and “patching” in complexity, cost, and time required. For example, a sophisticated network defence software contains between 5 million and 10 million lines of code, whereas an attack malware contains an average of 170 lines of code. Also, protection of critical government networks typically requires standard government competition and contracting, which can take years before solutions are initiated, whereas designing an attack can be accomplished in weeks. While network defence against sophisticated attackers requires advanced work by highly specialised firms, network attack is literally a cottage industry.

**Deterrence:** Is it fair to draw a direct analogy between nuclear deterrence or traditional military deterrence and cyber deterrence wherein we may not know exactly who did it? Or what is the assessment of collateral damage due to interdependence on target infrastructure? Or how much are we prepared to absorb a retaliatory cyber attack? The notion of deterrence in cyber space is something that works today but may not work tomorrow (indeed, precisely because it did work today). Thus, deterrence and war-fighting tenets established in other media do not necessarily translate reliably into cyber space. Such tenets must be rethought.

The attraction of cyber deterrence is that, if it works, it can reduce the cost of defending systems. How do we build credible cyber deterrence? One chief way any deterrence works on the minds of the attackers is the defender’s coercive power. It can be made visible very easily in real space by positioning kinetic weapon systems such as tanks, missiles, aircraft and carriers but to demonstrate coercion capability in cyber space, the biggest challenge is of credibility. The attacker may not be sure of what a cyber attack may do to the defender’s economy or society because the attacker may neither be sure of his own vulnerabilities nor of the defender’s capabilities.

In such a credibility crisis, to ensure that cyber deterrence remains effective, the defender may have to strike the attacker to demonstrate some coercive capability. At the same time, it is important on the part of the defender to signal that a specific attack on the attacker's vulnerability was to coerce in order to accrue maximum deterrence credibility.

**It is noteworthy that so far terrorists have not carried out any visible attacks against internet infrastructure.**

The calculus of the deterrence should be based on the principle that the lower the chances of getting caught, the higher the penalty required to drive the message to the potential attackers that what they might want to try is not worth the cost they would have to pay. Like having established the source of cyber espionage, if the NTRO (National Technical Research Organisation) is able to demonstrate stern punitive and surgical action in cyber space, it would enhance the credibility of cyber deterrence and, thus, increase the cost of such misadventures in the future in the minds of opponents. But the problem is that this calculus is not applicable to terrorists' organisations as they have nothing much at stake in the cyber domain. Therefore, non-state actors and rogue states, with little to lose in the cyber domain probably cannot be deterred by the threat of cyber retaliation.

#### **LEVERAGING THE INTERNET: NEW TRENDS IN CYBER TERRORISM**

There are different shades of terrorism painted through the virtues of the internet. Some would call themselves Islamist, Marxist, nationalist, Maoists, separatist, or racist. All of them use the virtues of the internet such as: it is ubiquitous, unregulated, and inexpensive; its potential audience is huge, worldwide, and it has easy access; communication is anonymous, fast, and robust. The multi-media environment facilitates development, maintenance and download. And, finally, it can shape coverage in the traditional mass media.

It is noteworthy that so far, terrorists have not carried out any visible attacks against internet infrastructure. The reason could be the fact that they need the internet as a recruitment tool and do not want to harm

the major medium facilitating their communication. Some of the many ways the internet is being exploited by the terrorists are as follows:

- **Convergence of Terrorism and Cyber Space:** On further investigation and a look beyond the definitional boundaries of ‘pure cyber-terrorism’, it is realised that cyber terrorism is not only when the attack is launched against computers but when many other factors and abilities of cyber-space are leveraged by the terrorists in order to accomplish their missions. For example, to get the Voice Over Internet Protocol (VOIP) facility which was used as a real-time tactical support to commit an act of terror in Mumbai on November 26, 2008, the terrorists used cyber space and globalisation to their advantage. They paid \$220 in Spain and \$229 in Italy that was channelised from Pakistan to Italy and then to Callphonex company in New Jersey to get this VOIP facility.
- **Internet as Terrorism Force Multiplier:** A computer is a technological tool that can be a force multiplier. What does that mean to terrorists? Just as the distinction between war and peace or criminality and political protest is blurring, so is the distinction between cyber disruption and cyber terrorism. Terrorists are taking full advantage of the force multiplier effect of cyber space. Firstly, the mass media are manipulated to expand the aura of the group. Secondly, trans-national support networks give small groups logistic support and mobility and, lastly, technology allows terrorists to increase the striking power of their weapons.
- **Cyber Planning: A Dangerous Weapon in the Terrorists’ Arsenal:** While the internet still offers its old promise of unparalleled opportunities, in some respects, it has also become a digital menace. It is providing a virtual battlefield for peace-time hostilities between Taiwan and China, Israel and Palestine, India and Pakistan and also China and the US.<sup>6</sup> During both wars of Kosovo and in the aftermath of the collision between the US Navy EP-3 aircraft and Chinese J-8-IIM fighter<sup>7</sup>, there have been digital battles. In the times of actual conflict, the internet was used as virtual battleground between NATO’s coalition forces and

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6. William Mathews , “China Cited as Biggest Cyber Threat to US” *Defense News* February, 8, 2010, p. 24.

7. [http://en.wikipedia.org/wiki/Hainan\\_Island\\_incident](http://en.wikipedia.org/wiki/Hainan_Island_incident)

elements of the Serbian population. There is strong evidence that Al Qaeda terrorists used the internet to plan 9/11. Al Qaeda cells operating from the US were using internet-based phone services to communicate with cells overseas till September 2002.<sup>8</sup> In this regard, cyber planning seems a more dangerous tool with terrorists than the much feared cyber terrorism options of attacking NCII, etc.

- **Internet as an Ideological Weapon:** As internet access can be controlled and its use can be directed according to server configuration, this makes the internet a true ideological weapon. In earlier days, most governments could censor or filter the content being shown on TV or published in newspapers if there was something offensive but this is not the case with the internet. The internet serves as the terrorists' international newspaper, TV station or radio station or journal. There are two distinct advantages accrued by the terrorists: firstly, the cost advantage as the web allows an uncensored and unfiltered version of an event to be broadcast worldwide at almost no cost. Secondly, the internet provides the most congenial environment for these underfunded groups to offset both internal and international condemnation of their acts by explaining their viewpoint to the target viewers, especially when using specific servers.
- **Internet Creates Virtual Army for Small Terrorist Groups:** The internet can empower the terrorist groups by making us believe that they are bigger than they are actually are through news reports, etc claiming that there are hundreds of thousands of operatives working on the net on a daily basis. This way they can spread cyber fear by exploiting the public psyche of: what will happen.. if? What will happen if they disrupt the critical information infrastructure, or disrupt the Air Traffic Control (ATC) or destroy the stock market? What if they reveal secret military computer network or the Indian Space Research Organisation's (ISRO's) research? However, in reality, the terrorists may not possess such capability.
- **Internet as Fund Raiser Apparatus:** The internet is being used in many ways to raise funds for terrorist organisations, including criminal

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8. Timothy L. Thomas, *Cyberterrorism* (Ashgate: UK 2004), Ch. 13, p. 112.

**The internet's command and control potential can vastly improve an organisation's effectiveness—more so when it does not have a well defined organisational structure.**

activities like credit card frauds, piracy or *hawala* transactions. As Jean-Fracois Ricard, one of France's top anti-terrorism investigators puts it, many Islamic terror plots in Europe and North America were financed through such methods. In other 'noble' ways of raising funds, it was found that Al Qaeda and humanitarian agencies were using the same bank account numbers on numerous occasions as a result of which many US-based Islamic charities were shut down.<sup>9</sup> The Sunni extremist group Hizb al-Tahrir uses an integrated web of internet sites from Europe to

Africa to call for the return of an Islamic caliphate, stating that it desires to carry out *jihad* by peaceful means.<sup>10</sup>

- **Internet as Intelligence Gathering Tool on Potential Enemy:** On January 15, 2003, the then US Defence Secretary Donald Rumsfeld had observed, as quoted in an Al Qaeda training manual recovered from Afghanistan, that using public sources openly and without resorting to illegal means, it is possible to gather at least 80 percent of all information required about an enemy.<sup>11</sup> Over a period of time, the terrorist organisations have become quite methodical in their approach to intelligence gathering. The discussions now include targets such as Supervisory Control and Data Access (SCADA) systems, money movement control systems, and facilities controlling the flow of information over the internet.<sup>12</sup>
- **Internet as an Outstanding Command and Control Mechanism:** The internet's command and control potential can vastly improve an organisation's effectiveness—more so when it does not have a well defined organisational structure. The terrorists now have access to the

9. Colin Soloway, Rod Norland, and Barbie Nadeau, "Hiding (and Seeking) Messages on the Web," *Newsweek*, June 17, 2002.

10. Timothy L. Thomas, "Al Qaeda and the Internet: The Danger of Cyber Planning, in *Cyber Terrorism* (Ashgate UK: 2004), Ch. 13, p 114.

11. "Citing Al Qaeda Manual, Rumsfeld Re-emphasises Web Security," *insidedefense.com*, <http://www.insidedefence.com/>, January 15, 2003.

12. Tom Squitieri, "Cyber Space Full of Terror Targets" *USA Today*, June, 5, 2002.

means of command and control to plan and coordinate attacks. Another aspect unique of cyber command and control is that through this, the terrorists today can control resources (i.e. men, computers, servers, links and electrons) that belong to others, including their adversaries. Command and control on the internet is not hindered by geographical distances, or by lack of sophisticated communication equipment

- **Internet to Study Anti-Terror Mechanism:** Terrorists are aware of the fact that their net communication is being monitored. When governments discover some imminent threat, a warning is issued to the security agencies. The terrorists could include fake information about a terror plot via routine media to check and measure the response of a security agency.

### COUNTER-CYBER TERRORISM STRATEGIES

The consequences of technologies are frequently unplanned and grossly unpredictable and best left that way as far as possible. To the counter-cyber terrorist agencies, even a threat of cyber terrorist attack comprises cyber terrorism to the extent that a mere possibility of a cyber attack against NCII components even without an explicit threat, is a matter of great concern. The counter-cyber terrorism professionals are faced with the reality of terrorists using advanced technology to hide their communications from prying eyes. Any terrorist organisation or group trying to evolve into a violent political movement would use cyber space to advance its cause. This is also the reality that counter-terrorism agencies are not organisationally prepared to defend against such advances in technology.<sup>13</sup>

**Cyber Forensics:** Cyber forensics is seen more as a tool used to investigate a chain of events once the crime has taken place. But it needs to be seen as a preemptive measure to stop terror incidents. Hence, a two-way consolidated model needs to be put in place to track terrorist activities and curb criminals.

- **Pre-event:** This model is predictive in nature and is driven by intelligence collected through the use of technology. As terrorists have increased

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13. Arquilla and Ronfeldt, *The Advent of Netwar* (RAND Monograph Report, 1996), p. 96.

dependence on the internet and on web technology, they are using cyber space for planning, communications, and logistics control. Network monitoring and forensics can pick up the indicators and triggers before the actual event takes place and generate intelligence inputs for agencies to investigate further. The process encompasses regular monitoring and collecting evidence through 'packet' level forensics, whereby packets of information moving in and going out are monitored. Subsequent analysis through data mining generates trends and patterns almost in real-time for further intelligence. The analysis can help in isolating patterns based on previously known 'suspicious' entities or on new ones, identifying and investigating 'triggers' or any unusual developments for future analysis and threat assessment.

- **Post-event:** This deals with the forensic science of all the equipment containing digital evidence such as computers, laptops, palmtops, mobile phones, satellite phones, GPS (Global Positioning System) devices, etc. In high profile cases and incidents, such as the Parliament attack in New Delhi in 2001, the Mumbai serial train blasts in 2006, and the 26/11 Mumbai attacks, cyber forensics played a decisive role in gathering e-evidence and collating the sequence of events for the prosecution of the suspects. This also provided the necessary breakthroughs and insights of how terrorists are masking their identities and executing their plans. Detailed post-event forensics is the critical component of intelligence gathering. It generates information and an evidence chain that then facilitates monitoring and tracking.

**Net-Centric Counter-Terrorism:** The key learning for intelligence agencies is that any activity over the internet leaves traces and communication patterns that can be tracked with a great degree of accuracy. However, the caveat here is that inflow and outflow of information have to be continuously and rigorously monitored. And here, cyber forensics plays a crucial role in investigations and intelligence gathering to curb and preempt terrorist activities. The pre- and post-event techniques of cyber forensics (supported by the evidence chain management) can help in anticipating, and appropriately reacting to, terrorist activities over cyber space.

To counter cyber terrorism, 'mapping the loose ends' is a very important component. In India, there are over 52 million internet users<sup>14</sup> and over 200,000 cyber cafés. The Indian government has asked café owners to authenticate internet users through their identity cards and to place CCTV (Closed Circuit TV) cameras in the cyber cafés. While it is a challenge for the law enforcement agencies to monitor every cyber café, it is here that cyber forensics-based audits and evidence gathering can play a pivotal role in preventing criminal use of the cyber cafés. Similarly, Internet Service Providers (ISPs) can use that technology to monitor the traffic data of the cyber cafés to a greater degree, and develop (real-time) trends and patterns at the micro level. Cyber forensics can be applied to networks and in the case of any red flags or once the IP is tracked, it can help in imaging the hard disk and track the individuals responsible for the activity. The metadata of the files or any document can be analysed and matched with the log maintained by the cyber café. Some of these measures would require policy and legal changes to ensure compliance and prevent misuse.

**Neither prevention nor preemption is possible in cyber space. Only effective countering can deny the terrorists the advantages presently enjoyed by them.**

Neither prevention nor preemption is possible in cyber space. Only effective countering can deny the terrorists the advantages presently enjoyed by them. Countering their innumerable websites by suppressing them would be counter-productive. The websites run by the *jihadi* organisations and their associates are a valuable source of open information regarding the terrorists. There would be no point in suppressing them. What need to be suppressed are those pages or sections of their websites which disseminate information about how to commit an act of terrorism. An effective counter to their use of the web for propaganda and psy-war purposes is not suppressing them, but the state developing better means of dissemination of information and a better psy-war capability in order to discredit the terrorist organisations and wean their followers away from them.

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14. <http://trak.in/tags/business/2010/04/07/internet-usage-india-report-2010/>

The most important component of net-centric counter-terrorism is the capability to monitor/intercept their communications through the internet, to break their codes and take timely action on the intelligence thus collected. Very few countries in the world presently have the human, financial and technical resources required for this. It would be very difficult to undertake this task through national capabilities alone. While there has been an increase in international cooperation by way of intelligence sharing, there is very little cooperation by way of technology sharing.

**Technology Sharing: A Double-Edged Sword:** Technology, which could facilitate better countering of the web presence of any entity, is a dual-target one. What can assist in countering the web presence of non-state actors would be equally helpful against states, hence, the reluctance to share this technology. The scope for cooperation would, therefore, continue to be limited. The post-9/11 period has seen greater bilateral and multilateral cooperation in cyber security, but this is presently restricted to sharing of training facilities and transfer of low-tech expertise. Every country, faced with threats from international *jihadi* terrorists and other terrorist organisations, has to invest considerable resources, time and effort in developing a national capability for internet communication penetration.

**Implanting Human Moles:** The internet provides a means of penetrating terrorist organisations through human moles by taking advantage of their online recruiting. This is an area of intelligence exploration, which deserves better attention than it has so far received.

## **SOCIAL, REGULATORY AND LEGAL ISSUES**

A discussion on the threat of cyber terrorism is generally focussed on the successful missions of the cyber terrorists and, in the bargain, the day-to-day usage of the internet by the terrorists that could decode their modus operandi is ignored. For terrorists, the internet is the most dynamic tool—the websites suddenly emerge, change, disappear, or, change their URL, but the contents remain the same.

Cyber terrorists mainly target three types of audience: current and potential supporters, international public opinion and citizens of the states against which the terrorists are fighting (to stimulate public debate).

**Challenges for Law Enforcement Agencies:** The challenges that cyber terrorism poses to the society and the Law Enforcement Agencies (LEAs) are two-fold:

- **The Terrorism in the Real World Using Cyber Space as a Conduit:** Terrorism in the physical world results in an adverse effect on the real world society, persons and property. Al Qaeda terrorists used the internet to download the topography of the Indian Parliament building and plan an attack based on such information. The internet was used to communicate amongst the members of the attacking team to carry out the act of terror in the real world. Similarly, when an e-mail chain is set-off on the internet, spreading a false story on the Godhra tragedy or a website such as dalistan.org is being published, there is an attempted use of cyber space to further the terrorist movement in the physical space.
- **Terrorism in Cyber Space Involving Destruction of Cyber Properties:** When the hackers of the Anti-India Force of Pakistan attack Indian websites and deface them, it is the cyber property of an Indian being attacked. In a more sophisticated attack, the website of economic significance such as the National Stock Exchange may be disabled through a virus or a Distributed Denial of Service Attack (DDoS) attack causing stoppage of a vital commercial activity.

Since real world terrorism laws are sometimes inadequate to meet the contingencies of cyber space and cyber society laws may be inadequate to deal with terrorist acts, there is enough scope for cyber terrorists to slip between the two legislations and escape conviction. The most important challenge before LEAs is, therefore, to understand the legal framework applicable to cyber terrorism and work within its limitations and yet meet the expectations of the society.

Additionally, like in the case of real world terrorism, the LEAs will have to neutralise the motivating forces behind the rise of terrorist movements in

**A very likely scenario in future modern conflicts that include cyber methods is the use of members of organised crime or half-legal entities for organising and covering up attacks.**

an accepted, civilised manner, not providing an opportunity for terrorists to hide behind human rights activists. This may require careful handling of the intelligence related functions without being accused of privacy invasion or censorship.

Also, since the cyber environment is built on networks and communication, cyber terrorism can be operated remotely with a highly distributed network of operators, creating all kinds of jurisdictional problems relating to intelligence gathering, investigation and conviction.

#### **ROLE OF THE INTERNATIONAL COMMUNITY**

**Reduce the Vulnerabilities to Asymmetric Threats:** The states will have to address potential threats to security that are likely to emerge as a result of an unequal distribution of soft power. Countries, regions and various groups already suffering economic hardship and political and cultural alienation are unlikely to feel the benefits of information technology easily.<sup>15</sup> Thus, while developed states may be tempted to exploit the opportunities afforded to them by information technologies in order to gain advantages over their rivals, they will have to weigh this against the cost of ignoring their vulnerability to asymmetrical threats.

A very likely scenario in future modern conflicts that include cyber methods is the use of members of organised crime or half-legal entities for organising and covering up attacks. It is still possible to lose traces and hide behind the fact that national regulations in criminalising cyber crime are very uneven, law enforcement personnel are overburdened

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15. The term and concept of security has been discussed by a great many scholars. Examples of this debate include: Barry Buzan, *People, States and Fear: An Agenda for International Security Studies in the Post-Cold War Era* (Harlow, 1991); David Baldwin, "Security Studies and the End of the Cold War", *World Politics*, 48/1 (1995): 117-41; Stephen Walt, "The Renaissance of Security Studies", *International Studies Quarterly*, 1991, p. 35.

in this area and there is not enough attention given to the issue of international cyber crime.

## CONCLUSION

The cyber terrorism issue is neither a collection of incidents that have already occurred, nor only a matter of what might happen in the future. It is to be understood as a strategic tool in the power game by terrorists, non-state and near-state actors. Computers can play an enormous role in terrorism and, at the same time, they can provide perhaps the most potent defence against terrorism if we use them to our advantage. It would be a grave mistake if we try to tackle pure cyber terrorism or cyber terrorism separately from the big picture of terrorism. In which case we would miss the true threat posed by the additional factors of cyber space in the playbooks of the terrorists.

Terrorist organisations cannot be defeated in the military sense. They can only be made to wither away by repeatedly denying them success, by diluting the motivation of their cadres and by drying up their flow of volunteers and funds. An important component of cyber counter-terrorism is, therefore, devising ways of denying them success in cyber space. But the international community is nowhere near achieving it.

As some opine, the threat of cyber terrorism is still a kind of ghost story without enough evidence to believe that the threat entails actual damage or death through its use. And that the scarce resources being drained in building counter-cyber terrorism may find a better use, especially in a developing economy like India. This argument is analogous to what the Japanese presented as they prepared to take on an expected Allied amphibious invasion in August 1945, while neglecting the defence of facilities located at Hiroshima and Nagasaki despite forewarnings.<sup>16</sup>

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16 [krex.k-state.edu/dspace/bitstream/2097/2161/1/JamesIsemann2009.pdf](http://krex.k-state.edu/dspace/bitstream/2097/2161/1/JamesIsemann2009.pdf)



# SITING OF INDIAN NUCLEAR PLANTS: THE MODUS OPERANDI

SITAKANTA MISHRA

It is not often that geography contributes something which is relevant to public policy and decision-making.<sup>1</sup> Considerations for siting of nuclear reactors provide one of these rare opportunities because the “locational component” is an important variable that largely determines the consequences of any nuclear emergency. Every industrial activity is prone to extreme meteorological conditions like an earthquake, flooding, tsunami, high velocity winds, etc. depending upon the geological condition it is situated in. Therefore, the engineered safety measures, though important, alone are not sufficient, as safety standards may be quite different in the future. Natural disasters, being location-specific, a geographically realistic and multi-attribute nuclear plant site evaluation methodology is warranted not only to ensure the safety of the current generation but also of future generations. India, which operates 20 reactors in seven locations, with a few more planned, follows a strict code of conduct for siting its nuclear reactors that is mistakenly presumed as being lackadaisical.

Questions have been raised regarding the vulnerability of India’s nuclear power plants to natural disasters when the country is on a nuclear expansion mode. Particularly in the aftermath of the Fukushima nuclear disaster, public protest against the proposed Jaitapur nuclear plant was

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1. Stan Openshaw, *Nuclear Power: Siting and Safety* (London: Routledge & Kegan Paul, 1986), p. xi.

**The six task forces, constituted for comprehensive safety evaluation of Indian nuclear power plants in the aftermath of the Fukushima disaster, have also indicated “the existence of adequate provisions at Indian nuclear power plants”.**

intensified. However, it has been overlooked that India has more than 335 reactor years of safe operation<sup>2</sup> and its nuclear plants have survived earthquakes and tsunamis in the past, though of a lesser degree. The six task forces, constituted for comprehensive safety evaluation of Indian nuclear power plants in the aftermath of the Fukushima disaster, have also indicated “the existence of adequate provisions at Indian nuclear power plants”.<sup>3</sup> Perceptibly, the concerned public is unaware of India’s strategy and principles of nuclear plant siting, design, operation, and de-commissioning. A thorough understanding of these aspects would reveal that no complacency

is entertained; rather, each nuclear disaster is monitored keenly for lessons and the desired precautions are undertaken in the Indian nuclear activities. In fact, the Indian nuclear plants are located and designed not only keeping in mind the possible disasters but also the postulated events in relation to design basis and beyond design basis.

### **POSSIBLE AND POSTULATED NATURAL DISASTERS**

Natural phenomena like earthquakes and surface faulting, landslides, rock falling, rock avalanche, debris flows, sand dune migration, wind speed, rainfall intensity, storms, cyclones, flooding, shoreline and riverbank erosion, etc. are a matter of concern for any industrial enterprise, including nuclear plants. However, most of these natural phenomena are location specific, depending upon the geological and meteorological features of the surrounding region. India’s seven nuclear plants with 20 nuclear reactors are sited in different geological and meteorological conditions: Kaiga Generation

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2. Srikumar Banerjee, “We are for an independent nuclear safety body. We have nothing to hide”, interviewed by Raj Chengappa, <http://www.tribuneindia.com/2011/20110619/main7.htm>, June 19, 2011.
  3. NPCIL, “Safety Evaluation of Indian Nuclear Power Plants Post Fukushima Incident (Interim Report), 2011, p. iii.

Station (KGS) in Karnataka; Madras Atomic Power Station (MAPS) in Tamil Nadu; Tarapur Atomic Power Station (TAPS) in Maharashtra; Kakrapar Atomic Power Plant (KAPP) in Gujarat; Narora Atomic Power Station (NAPS) in Uttar Pradesh; and Rawatbhata Atomic Power Station (RAPS) in Rajasthan. Several existing Indian plants are on the coast and many other proposed plants would be sited both offshore and inland.

While one can imagine that an earthquake may affect nuclear plants relative to the distance from the epicentre, theoretically, specific plants are prone to specific natural disasters due to their specific geographic location and climatic conditions. Theoretically, the coastal plants are prone to a tsunami and cyclone, and plants located in the plains may be prone to flooding (due to dam break), tornado, hurricane, etc. In that context, a threat to the plant in Rajasthan can be postulated to emanate from an earthquake and the Gandhi Sagar and Rana Pratap Sagar dam break. The Narora plant in Uttar Pradesh, located in Seismic Zone IV and on the banks of the river Ganges, may be prone to earthquakes and floods. The Madras Atomic Power Station, located in the east coast of Tamil Nadu, witnessed the tsunami in December 2004 and also the coast is prone to cyclonic storms. The Kaiga station, situated near the river Kali in Uttara Kannada district of Karnataka may be subject to the Kadra dam break and flooding. The threat to the Tarapur Atomic Power Station can be postulated to emanate from a tsunami and floods caused by torrential rain as it is located on the west coast. However, a serious look at the siting policy of India would reveal that all “nuclear plants are designed to withstand the loading effects due to hazards from external events.”<sup>4</sup> Also, monitoring and upgradation are undertaken constantly to cope with the changing threat situation.

## **MAP AND MAGNITUDE OF DISASTERS**

India is vulnerable to different types of natural disasters originating mainly from its tropical meteorology and Himalayan and littoral geology. The Indian mainland comprises four regions: the Great Mountain Zone, the

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4. Roshan A.D, P. Shylamoni Sourav Acharya, “Monograph on Siting of Nuclear Power Plants”, Civil & Structural Engineering Division, AERB, <http://www.aerb.gov.in/t/sj/Siting.pdf>, p. 1.

**Among these past natural phenomena, only a few have been causes of concern for India's nuclear establishment.**

Plains of the Indus, Ganges and Brahmaputra, the Desert Region, and the Southern Peninsula.<sup>5</sup> However, from the point of view of a threat to nuclear facilities, though specific natural calamities are natural to all these zones, only a few categories of natural disasters draw attention.

Major and minor earthquakes, tsunamis, cyclones, and floods have occurred several times in and around India with some effects. According to the Indian

Meteorological Department, over nearly two centuries, from the year 1819 to 2005, around 23 major earthquakes of the magnitude of 6 to 9 on the Richter scale have occurred in India and its neighbourhood.<sup>6</sup> The Atomic Energy Regulatory Board (AERB) records show that at least 10 "major earthquakes" occurred between 1950 and 2006.<sup>7</sup> According to another source, from 1900 to 2004, 133 cyclones and 158 floods of significant intensity have occurred in India.<sup>8</sup> During 1891 to 1986, five storms with wind speeds ranging from 17 m/s to 31.7 m/s were recorded in and around the Gulf of Mannar where the Kudankulam nuclear plant is under construction. One of the storms passed near the Kudankulam Nuclear Power Plant (KKNPP) construction site, while two of the storms, including the strongest one, passed 100 km north of the site.<sup>9</sup> The occurrence of a tsunami in the Indian Ocean and adjacent areas is frequent and sometimes it reaches the Indian shores. Though the occurrence of a tsunami along the Makran Subduction Zone is infrequent,<sup>10</sup> the potential for the generation of destructive tsunamis in

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5. "Major Natural Disasters in India", <http://www.bmtpc.org/pubs/techno/chapter-1.pdf>
  6. "List of Some Significant Earthquakes in India and its Neighbourhood", <http://imd.gov.in/section/seismo/static/signif.htm>
  7. Ajai S. Pisharady, A.D. Roshan, Vijay V. Muthekar, "Seismic Safety of Nuclear Power Plants: A Monograph", Civil & Structural Engineering Division, AERB, p. <http://aerb.gov.in/t/sj/SeismicSafety.pdf>, p. 10.
  8. "India Natural Disaster Profile", The Earth Institute, Columbia University, [http://www.ldeo.columbia.edu/chrr/research/profiles/pdfs/india\\_profile.pdf](http://www.ldeo.columbia.edu/chrr/research/profiles/pdfs/india_profile.pdf)
  9. DAE, "Safety Evaluation of Indian NPPs Post Fukushima Incident", Reports of the Task Forces, p. 24
  10. George Pararas-Carayannis, "Potential of Tsunami Generation Along the Makran Subduction Zone in the Northern Arabian Sea. Case Study: The Earthquake and Tsunami of November 28, 1945", <http://www.drgeorgepc.com/TsunamiPotentialMakranSZ.html>

the northern Arabian Sea and its impact on India's western shore cannot be overlooked.

However, among these past natural phenomena, only a few have been causes of concern for India's nuclear establishment. For instance, the floods in 1994, due to the heavy rain in the Tapi district (Gujarat), the Bhuj earthquake in 2001, and the Indian Ocean tsunami in 2004, raised many issues relating to India's nuclear safety preparedness.

**The Kakrapar Flooding:** In mid-June 1994, Kakrapar experienced unusual heavy rain for 15 hours, together with non-operation of the weir control for the adjoining water pond that caused flooding of the Kakrapar Atomic Power Plant (KAPP) site. Owing to the clogging of the discharge sluice gates of the nearby Moticher lake into the Tapi river, water flooded into the nuclear facility – into the turbine building basement, pump house and cable tunnels from the turbine building and the switchyard.<sup>11</sup> At that time, KAPP-1 was under shutdown state and KAPP-2 was under commissioning.

**The 2001 Bhuj Earthquake:** The January 26, 2001 earthquake at Bhuj (Gujarat), measuring 6.9 on the Richter scale, was felt at three nuclear plants viz., Kakrapar, Narora and Rawatbhata. All these plants experienced a level of vibration much below (only 5 to 10 percent) the level for which these plants are designed.<sup>12</sup> The inspections of these plants indicated that the distress observed in these plants was "very minor and was too in non-structural elements".<sup>13</sup>

**The 2004 Indian Ocean Tsunami:** The tsunami in the Indian Ocean that resulted in the earthquake in the Sumatra fault on December 26, 2004, affected MAPS, though without major consequences.<sup>14</sup> During that time, Unit-2 was operating and Unit-1 was under long shutdown for en masse coolant channel replacement and upgradation. The tsunami waves that hit the coast entered the facility and raised the water level in the sea water pump house of the plant, resulting in tripping of the condenser cooling

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11. A.R. Sundarajan, K.S. Parthasarathy, S. Sinha, "25 Years of Safety Regulation", AERB, November 2008, p. 37-38.

12. A.S. Warudkar, "Seismic Design Considerations for Nuclear Structures", *Nu-Power*, vol. 15, no. 1 to 4, 2001

13. *Ibid.*, p. 37.

14. "Safety Evaluation Of Indian Nuclear Power Plants Post Fukushima Incident", [http://www.npcil.nic.in/pdf/Final\\_Report\\_Four\\_TFs\\_combined\\_report.pdf](http://www.npcil.nic.in/pdf/Final_Report_Four_TFs_combined_report.pdf)

water pumps.<sup>15</sup> The increase in the water level in the pump house made all the sea water pumps unavailable. Though the damage caused was limited only to some infrastructures like the plant boundary on the sea side and inundation of roads on the east side of the turbine building, it was certainly a wake-up call for the nuclear establishment.

These and other incidents have been taken seriously by India's nuclear establishment. Moreover, a cursory look at the history of natural disasters vis-à-vis nuclear facilities in India would suggest that India's nuclear plants are relatively more prone to earthquake, flood and tsunami occurrences than any other geological and meteorological phenomena that generally affect India's landmass.

### **THE FEASIBILITY DEBATE**

The very issue of the safety of nuclear plants and their effects is centred on the *feasibility of the nuclear power plants'* debate which is as old as India's interest in nuclear energy itself. In fact, the process of setting up nuclear power plants is not a simple and single decision. During the five major stages in the life of nuclear power plants – siting, design, construction, operation and decommissioning – many important criteria are strictly to be met. First of all, there should be a demand for power for which the nuclear option is to be considered. During the first decade after independence, the Government of India decided to establish atomic power projects as it was viewed as a remedy to India's energy ailment in the long-term. Setting up of a Nuclear Power Plant (NPP) in India during those days was considered "viable beyond a distance of 700 km from the coal belt" (Map 1).<sup>16</sup> As the coal deposits in India are concentrated in the eastern regions, the setting up of a coal-fired power plant in western India and in the northwest entails transporting coal over distances exceeding 1,000 km. Therefore, the "economics of nuclear power becomes favourable" in the western, southern and northern areas.<sup>17</sup>

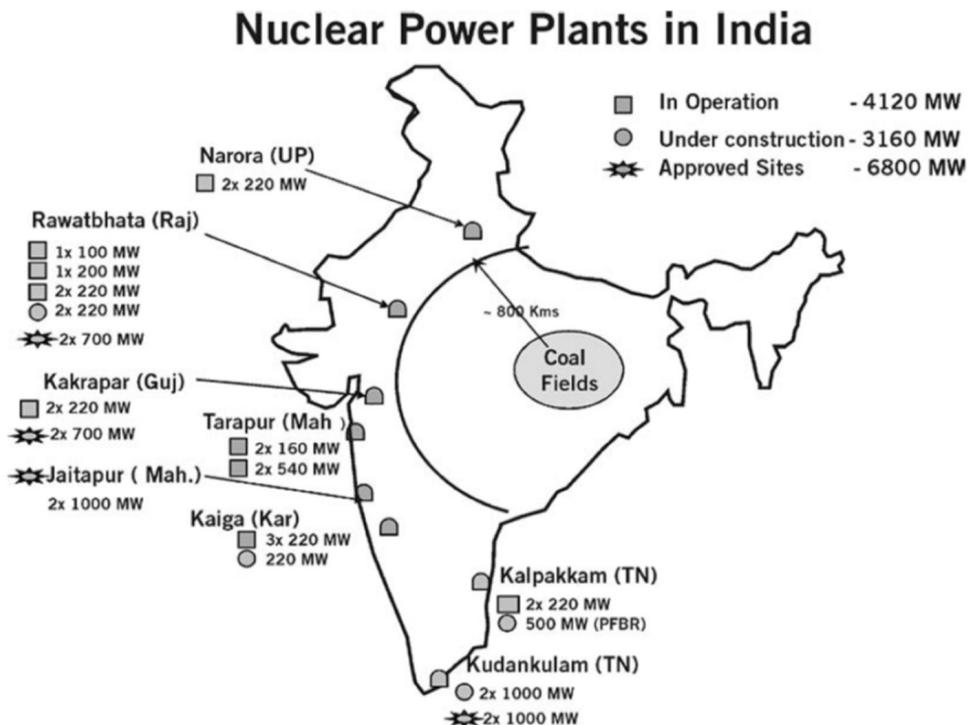
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15. Sundarajan, et. al., n. 11, p. 125.

16. M.N. Ray, "Hand Book on Site Selection Process", NPCIL, 2010, p. 1.

17. Yoginder K. Alagh, "Economics of Nuclear Power In India", <http://www.igcar.gov.in/nuclear/alagh.htm>

Map 1: NPPs Under Operation, Construction and Approved by Government of India



Nuclear Power Plants under operation, construction and approved by Govt of India.

Source: M.N. Ray, Hand Book on Site Selection Process, NPCIL, 2010, p. 20.

On this basis, the first project team was formed under the chairmanship of M.N. Chakravarti in 1959 for selection of sites for NPPs in the western region and it shortlisted two sites – Tarapur and Kakrapar.<sup>18</sup> In 1961, the first Site Selection Committee (SSC) was constituted under the chairmanship of M. Hayath, with the mandate to investigate sites in the southern and northern regions. Out of various sites recommended by this committee, the Government of India accepted two sites – Rawatbhata in Rajasthan and Kalpakkam in Tamil Nadu.<sup>19</sup> Subsequently, the SSC under the chairmanship of M.N. Chakravarti and V.R. Vengurlekar examined the feasibility of

18. Ray, n. 16, p. 1

19. Ibid.

nuclear plants in the northern, western and southern regions (during the mid-1970s). The Narora plant in Uttar Pradesh, which is often criticised for being sited in Seismic Zone IV, was selected by this committee.<sup>20</sup>

With the aim to increase nuclear energy production to 10,000 MWe by the year 2000, an SSC was constituted in 1983 under the chairmanship of M.R. Srinivasan to assess sites in all the four electricity regions – southern, northern, western and eastern. Fifteen sites were selected by this committee for the government’s consideration (Table 1).

**Table 1: Selected Nuclear Sites at Different Regions**

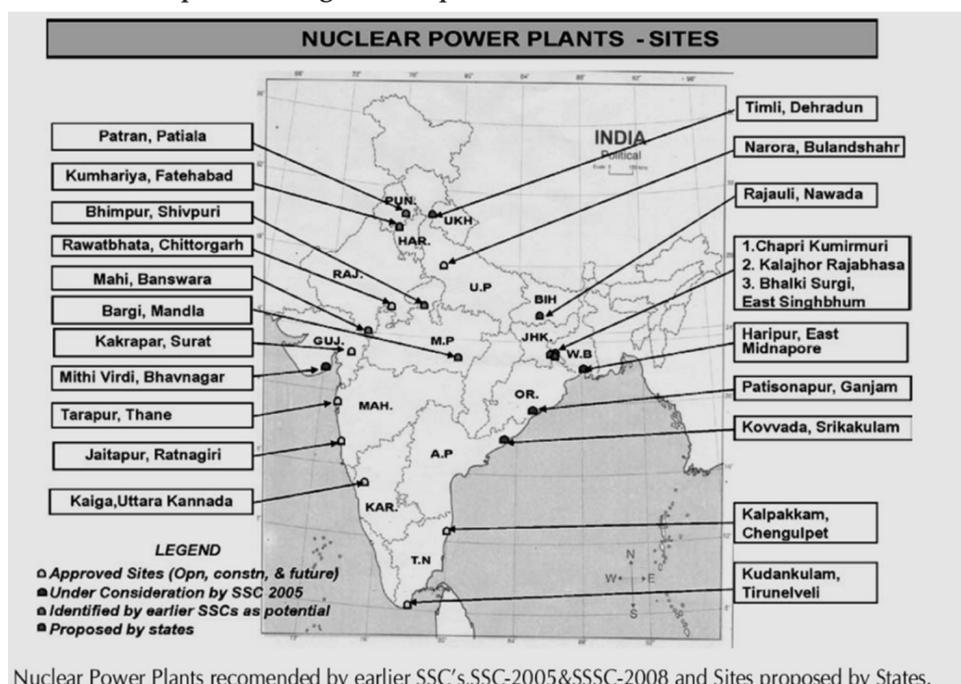
Region	Selected Sites
Southern Region	Kaiga in Karnataka Kudankulam in Tamil Nadu Kalpakkam in Tamil Nadu
Northern Region	Rawatbhata in Rajasthan Narora in Uttar Pradesh (UP) Patran in Punjab Kumharia in Haryana Mahi-Banswara in Rajasthan Matatila in UP
Western Region	Tarapur in Maharashtra Kakrapar in Gujarat Ujaini in Maharashtra Rajapur in Madhya Pradesh (MP) Jaitapur in Maharashtra Bargi in MP

The Technical Committee, under the chairmanship of S. Krishnan identified three more sites for the future – Peringome (Kerala), Nagarjunsagar and Kovvada (Andhra Pradesh). The 1998 SSC, under the chairmanship of Y.S.R. Prasad, studied the additional potential of existing sites. In addition, it identified three new sites – Bargi and Rajapur (Madhya Pradesh) and Mahi-Banswara (Rajasthan) – for consideration. The 2005 SSC focus was

20. Ibid.

on potential coastal sites, but it was also tasked later to consider inland sites, with the concurrence of the state governments. Some of the sites recommended by the SSC 2005 and the Standing Site Selection Committee (SSSC) 2008 (Map 2) have been taken up for serious consideration during the last few years as India has set an ambitious target of 63,000 MWe production by 2032.<sup>21</sup>

Map 2: Existing and Proposed Nuclear Power Plant Sites



Nuclear Power Plants recommended by earlier SSC's, SSC-2005 & SSSC-2008 and Sites proposed by States.

Source: M.N. Ray, Hand Book on Site Selection Process, NPCIL, 2010, p. 21

Currently, the feasibility debate of siting of nuclear plants in India seems to be centred more on the government's and the nuclear establishment's initiatives which seem to be driven both by the "economy of nuclear power" and confidence in the safety and security preparedness. On the other hand, the issue of "public acceptance" of sites is based on their safety and security presumptions, environmental protection and displacement of the native

21. "Nuclear Power in India", <http://www.world-nuclear.org/info/inf53.html>

**Among the five major stages – siting, design, construction, operation, and decommissioning – in the lifetime of a nuclear power plant, the siting process involves enormous difficulties as the starting point.**

population. The International Atomic Energy Agency (IAEA) Nuclear Technology Review 2009 observed that the Public Acceptance Index (PAI) of nuclear energy in India has grown from around 60 percent in 2005 to around 90 percent during 2008.<sup>22</sup> But, post-Fukushima nuclear disaster in March 2011 and the Nuclear Suppliers Group (NSG) plenary session in June 2011 that voted against the supply of nuclear Enrichment and Reprocessing (ENR) to non-nuclear Non-Proliferation Treaty (NPT) members have raised many apprehensions. However, the findings of six task forces constituted by the Prime Minister in the aftermath of the Japanese nuclear disaster for comprehensive reevaluation of the safety and security of Indian nuclear plants assert that “adequate provisions exist at Indian nuclear power plants to handle station blackout situation”.<sup>23</sup>

Therefore, the feasibility debate in India seems to be polarised: (a) a section of the public is opposed to anything nuclear; (b) the government and nuclear establishment are confident about the safety, security and benefit out of their plans and initiatives. In fact, the general masses are unaware of the nitty-gritty of nuclear technology matters and, at the same time, also unaware of the enormous precautions undertaken by the nuclear establishment in all activities, starting from the site selection process and during subsequent activities. The problem seems to be lack of information among the people owing to the communication gap between the scientific community and the public – indicating lopsided nuclear information management in the country.

### **THE SITING MODUS OPERANDI**

Among the five major stages – siting, design, construction, operation, and decommissioning – in the lifetime of a nuclear power plant, the siting process

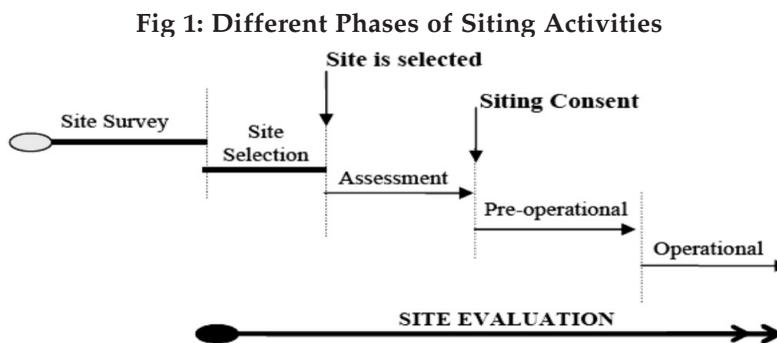
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22. “Nuclear Technology Review 2009”, [http://www.iaea.org/About/Policy/GC/GC53/GC53InfDocuments/English/gc53inf-3\\_en.pdf](http://www.iaea.org/About/Policy/GC/GC53/GC53InfDocuments/English/gc53inf-3_en.pdf), p. 15

23. NPCIL, “Safety Evaluation of Indian Nuclear Power Plants Post Fukushima Incident (Interim Report), 2011, p. iii.

involves enormous difficulties as the starting point. The siting process comprises two basic stages – site survey and site evaluation. Both involve enormous consideration on the availability of the required infrastructure, economics, sociological aspects, general safety, technical feasibility and engineerability of the site.<sup>24</sup> Activities, especially during the site survey stage, involve identification of prospective locations, data collection on the candidate site and related preliminary investigation. On the other hand, site evaluation involves satisfactory demonstration of acceptability of the site using the data collected. If the data on a candidate site are satisfactory, derivation of site-related design is undertaken subsequently. However, site evaluation activity (Fig 1) is a continuous process throughout the plant's life to ensure safe operation.

**In India, the AERB, as the regulatory agency, stipulates the safety requirements for each stage of nuclear plant activities.**



Source: A.D. Roshan et al, "Siting of Nuclear Power Plants", <http://www.aerb.gov.in/t/sj/Siting.pdf>, p. 1.

In India, the AERB, as the regulatory agency, stipulates the safety requirements for each stage of nuclear plant activities. The site selection process starts with notification by the Government of India to search for a new site or expansion of the existing one, if possible. The Secretary of

24. A.D. Roshan et al, "Mongraph on Siting of Nuclear Power Plants", <http://www.aerb.gov.in/t/sj/Siting.pdf>, p. 1.

**For selecting or eliminating a candidate site, a large region is investigated, taking into account three basic aspects.**

the Department of Atomic Energy (DAE) appoints the SSC which shall function by abiding by all regulations of the AERB and the Ministry of Environment and Forests (MoEF). The SSC is generally composed of members from different departments of the central government having knowledge of the rules and regulations related to the environment and forestry, electric power, health and safety, nuclear engineering, etc. For the ground work, the Chairman of the SSC

appoints technical sub-committees whose task is to compile the necessary data on geography, demography, meteorology, infrastructure, and the habitat of the prospective sites by physical surveys. They interact also with the respective nodal officers appointed by the respective state governments regarding all matters. In the process of considering a site, certain stringent criteria are followed, as laid down by the AERB Safety Code (AERB/NF/SG/S-3)<sup>25</sup>:

#### *Acceptance/Rejection Criteria*

For selecting or eliminating a candidate site, a large region is investigated, taking into account three basic aspects: (1) impact of external events, both natural and human-induced, on the plant; (2) impact of the plant on the site, environment and public; and (3) factors affecting implementation of emergency measures in the public domain.<sup>26</sup> The rejection criteria, generally given in terms of Screening Distance Value (SDV)<sup>27</sup>, are applied at the site selection stage to shortlist the candidate sites.<sup>28</sup> Failure to obtain data on them would deem rejection of the candidate site. The mandatory data requirements are on wind, rainfall/flood, vibratory seismic motion, etc. whose effects are necessary to evaluate and adjust during the design process

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25. AERB, "Extreme Values of Meteorological Parameters", <http://www.aerb.gov.in/T/PUBLICATIONS/CODESGUIDES/sg-s-3.pdf>

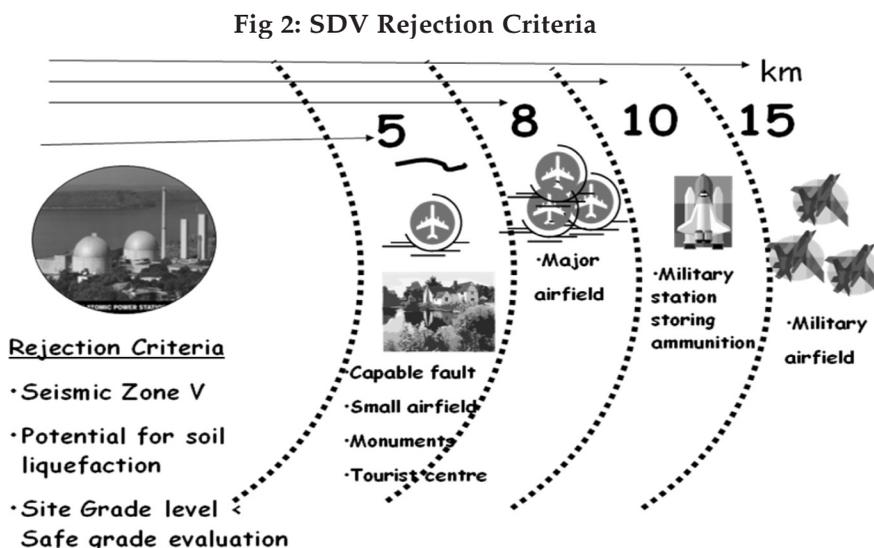
26. L.R. Bishnoi and Prabir C. Basu, "Siting of Nuclear Installations", [http://www.dae.gov.in/ni/nifeb05/PDF/04Siting\\_nuclear.pdf](http://www.dae.gov.in/ni/nifeb05/PDF/04Siting_nuclear.pdf), p. 7

27. SDV is the maximum distance from the source to the site at which the volcanic phenomenon could be a hazard.

28. Roshan et al., n. 4, p.3.

of the plant. The third category of data is desirable but its non-fulfilment does not affect the plant attributes, e.g. distance to facilities handling inflammable/toxic/explosive substances, population around, etc.<sup>29</sup>

The rejection criteria and SDV are applicable to the candidate site's distance to the seismic fault or the seismic zone it is situated in, proximity to airports, defence installations, distance from industries, and historical monuments.



Regions falling in Seismic Zone V (Map 3), as per Bureau of Indian Standards (BIS) 1893, are strictly rejected for nuclear projects. Environmentally sensitive locations like national parks and marine environment may invoke the rejection criteria. Existence of places like architectural or historical monuments, pilgrimage or tourist interest within 5 km of the site, a major airfield within 8 km, a military station storing ammunition within 10 km and a military airfield within 15 km are rejection criteria for a candidate site.<sup>30</sup> The site is also evaluated keeping in mind the safety aspects of storage and transport of radioactive materials and emergency evacuation.

29. Ibid.

30. Ministry of Environment & Forests, "Environmental Impact Assessment Guidance Manual for Nuclear Power Plants, Nuclear Fuel Reprocessing Plants and Nuclear Waste Management Plants", March 2010, [http://moef.nic.in/Manuals/Nuclear%20Power%20Plants\\_may-10.pdf](http://moef.nic.in/Manuals/Nuclear%20Power%20Plants_may-10.pdf)

**In India, seismic guidelines and design requirements for the NPPs are “quite stringent” and generally they are designed for two levels of earthquakes.**

**Seismic Event Considerations:** The Indian National Standard (“Criteria for Earthquake Resistant Design of Structures”, IS 1893)<sup>31</sup> divides the country into four seismic zones – Zones II, III, IV and V – and specifies the maximum possible earthquake in each zone (Map 3). The Geological Survey of India (GSI) has also compiled a catalogue of Indian earthquakes by studying extensively the seismic events. Accordingly, earthquake resistant design structures are prescribed for both civilian and industrial structures, mainly to transfer the inertial force caused by the earthquake safely to the foundation, without causing damage to the structure.<sup>32</sup>

In India, seismic guidelines and design requirements for the NPPs are “quite stringent” and generally they are designed for two levels of earthquakes, namely the S-1 level earthquake or Operating Basis Earthquake (OBE), and the S-2 level earthquake or Safe Shutdown Earthquake (SSE).<sup>33</sup> The OBE level seismic event is the event corresponding to the earthquake level which is expected to occur at least once during the life of the plant. The SSE corresponds to the credible maximum seismic event expected at the site and is determined considering the local geology and seismology and specific characteristics of local sub-surface material.<sup>34</sup>

The straightforward approach to mitigate threats out of any seismic event is not to allow siting of any NPPs in seismic volatile regions. It is ensured that no nuclear plant is sited in Zone V that constitutes the Himalayan belt and northeast India. So far, most of the Indian nuclear facilities are located in Zones II and III which are less prone to seismic hazards. Only the Narora plant is situated in Zone IV; however, many upgraded safety features have

31. “Indian Standards on Earthquake Engineering”, <http://www.bis.org.in/other/quake.htm>; Bureau of Indian Standards, IS 1893, “Criteria for Earthquake Resistant Design of Structures: Part 1, General Provisions and Buildings”, 2002.

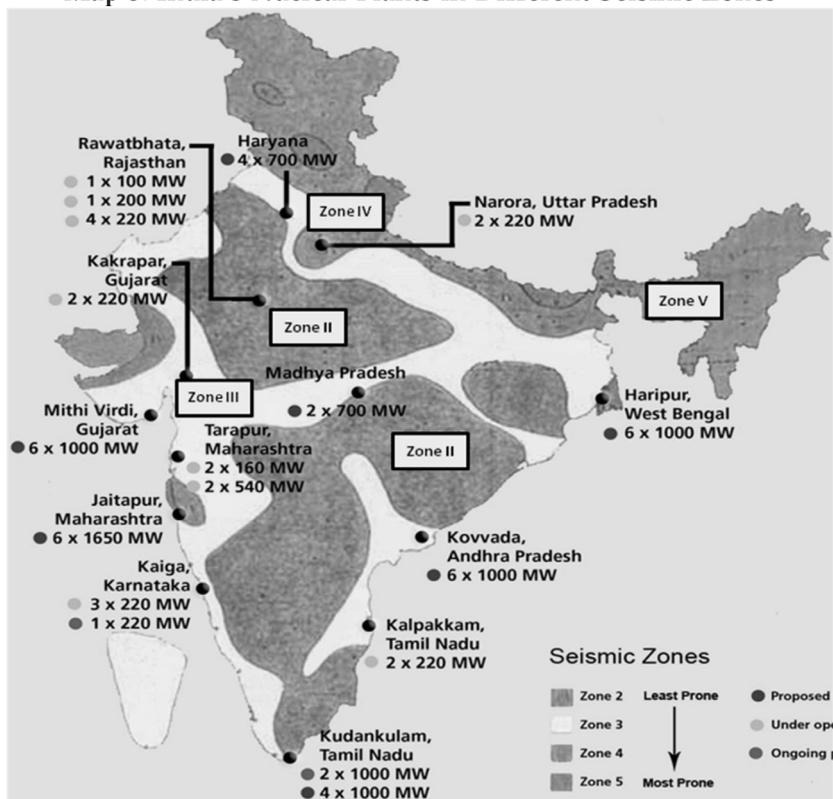
32. “Learning Earthquake Design and Construction; What are the Seismic Effects on Structures?”, <http://www.ias.ac.in/resonance/Oct2004/pdf/Oct2004Classroom2.pdf>

33. AERB, “Safety Guide for Seismic Studies and Design Basis Ground Motion for Nuclear Power Plant Sites”, AERB/SG/S-11, 1990.

34. Ajai S. Pisharady, et al., “Seismic Safety of Nuclear Power Plants: A Monograph”, Civil & Structural Engineering Division, AERB, p. 1.

been introduced to the facility.

Map 3: India's Nuclear Plants in Different Seismic Zones



Source: [http://www.downtoearth.org.in/dte/userfiles/images/Earth\\_quake\\_map.jpg](http://www.downtoearth.org.in/dte/userfiles/images/Earth_quake_map.jpg)

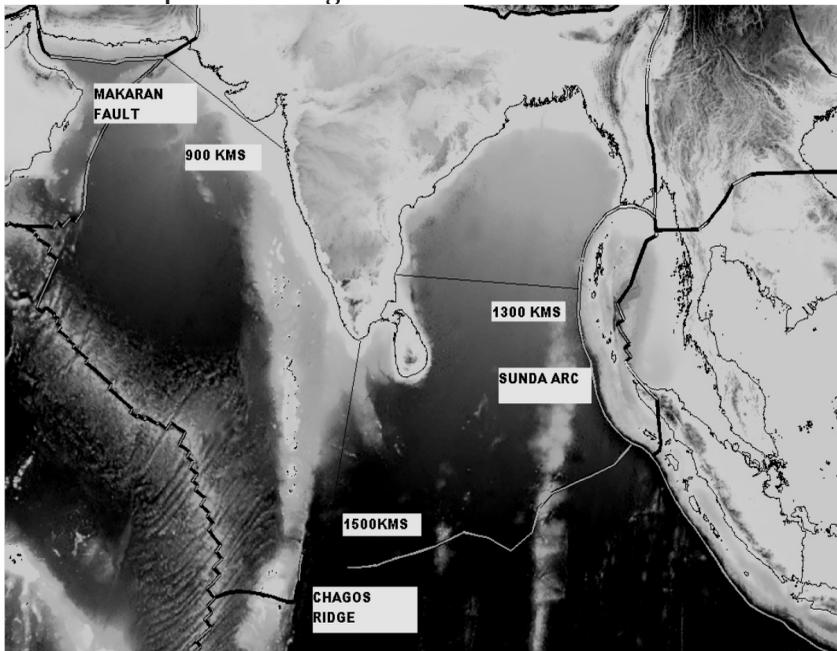
More importantly, a seismic design is adhered to from the very inception of the plant, taking into account the intensity, magnitude and history of earthquakes that have occurred in the region and adjacent to it. On this basis, a site specific seismotectonic report is prepared, using the services of expert geologists and seismologists from the Geological Survey of India (GSI), Atomic Mineral Exploration Directorate (AMDER), National Geophysical Research Institute (NGRI, and National Institute of Rock Mechanics (NIRM).<sup>35</sup> The report covers all the faults and lineaments

35. Ray, n. 16, p. 14.

that exist within a radius of 300 km around the site, in addition to all the seismic events recorded and postulated against these faults/lineaments. The geotechnical investigation report prepared by them has to be based on drilling of at least 6 boreholes each up to a depth of 60-100m.<sup>36</sup>

**Tsunamigenic Survey:** As a corollary to the seismotectonic survey, the tsunamigenic study takes into account the distance faultlines which might cause a tsunami that reaches Indian shores. There are expressed apprehensions on off-shore nuclear facilities, especially the proposed Jaitapur nuclear plant, that might be affected by a tsunami flood. As Map 4 shows, the nearest faultline in the northwestern direction is the Makran fault, which is 900 km away. The nearest faultline in the south is the Chagos Ridge which is 1,600 km away from Indian shores. In the southeastern side, the Sunda Arc fault is 1,300 km away.

**Map 4: Tsunamigenic Locations for Indian Coast**



Source: S.A. Bhardwaj (NPCIL), "Indian Nuclear Reactors – Siting and Technology Issues", paper presented at CAPS seminar on Nuclear Energy Post-Fukushima, April 2011, New Delhi.

36. Ibid., p. 9

From the safety and security point of view, the allegation over the proposed Jaitapur plant as unsafe seems misplaced. Jaitapur comes under Seismic Zone III where severe seismic activity is less likely. The nearest faultline is far away from Jaitapur; rather, the special advantage of Jaitapur is that it is adjacent to the sea and is at a height of 20m above sea level which is a natural tsunami saviour.<sup>37</sup> Particularly for the coastal plants, it is ensured that "Site Grade Level", at least "Safe Grade Elevation" (estimated based on highest flood level due to rain, dam break, flooding due to storm surge/tsunami and high tide in the sea) is maintained.<sup>38</sup>

Once the seismogenetic and tsunamigenic report is obtained, the AERB performs detailed multi-tier safety reviews for the projects for all major consenting stages. For siting consent, the SSC performs the first tier review, the Advisory Committee for Project Safety Review performs the second tier review and the Board of AERB performs the third tier review.<sup>39</sup> The extensiveness of the review process can be assessed from the 530 Safety Committee meetings, 325 Working Group meetings, and 28,000 mandays spent for the review process of the TAPS-3&4 site only.<sup>40</sup>

After the preliminary geological and meteorological survey, if the data collected satisfy the defined parameters, a site specific seismic blueprint of the plant is designed with site specific requirements which are also subject to a multi-tier review. For the construction and commissioning stage, the first tier review is carried out by the Design Safety Review Committee; the second tier review is by the Advisory Committee for Project Safety Review; and the Board of AERB performs the third tier review.<sup>41</sup> As per the AERB Safety Guide No. AERB/SG/G-8, the most desirable criterion is the specific density of population in the vicinity. In the candidate site, the population density should be less than 2/3 of the concerned state's average population density. Population within 5 km (sterilised zone) should be less than 20,000

37. "We will open up our n-programme: Srikumar Banerjee", Interview of Sri Kumar Banerjee, Chairman DAE by Iftikhar Gilani, at [http://www.tehelka.com/story\\_main49.asp?filename=Ws300411INTERVIEWII.asp](http://www.tehelka.com/story_main49.asp?filename=Ws300411INTERVIEWII.asp), April 30, 2011.

38. "Hydrologic Engineering", <http://pbadupws.nrc.gov/docs/ML1104/ML110410238.pdf>

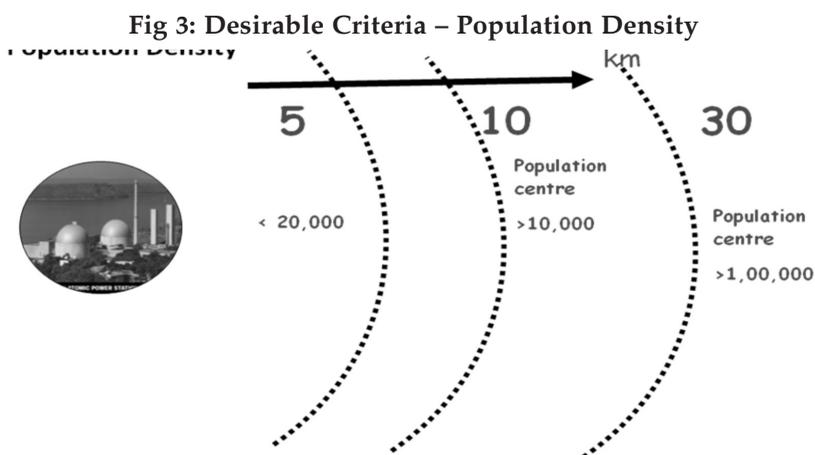
39. AERB, "The Regulatory Process Related to Nuclear Facilities and Its Implementation", <http://www.aerb.gov.in/T/documents/regprocess.pdf>

40. Ibid.

41. Ibid.

**Before starting any further steps, environmental clearance from the MoEF is mandatory.**

persons. The distance of population centres beyond 10,000 persons should be at least more than 10 km and the distance of large population centres exceeding 1,00,000 persons should be more than 30 km.<sup>42</sup> Also, the location of a port/dry port should be at a distance of 5 km and the terrain of the candidate site should be reasonably flat.<sup>43</sup>



### *Environmental Impact Assessment*

Before starting any further steps, environmental clearance from the MoEF is mandatory.<sup>44</sup> If the candidate site is offshore, clearance under Coastal Regulation Zone (CRZ) Notification (1991) is also mandatory. Through the Environment Impact Assessment (EIA) report and clearance from CRZ, the environmental cost benefit analysis, project risk assessment, disaster management and emergency preparedness measures are assessed. Also, the public, as an important stakeholder, is to be consulted and an extensive

42. AERB Safety Guide No. AERB/SG/G-8, "Criteria For Regulation of Health and Safety of Nuclear Power Plant Personnel, the Public and the Environment", June 2001, <http://www.aerb.gov.in/T/PUBLICATIONS/CODESGUIDES/SG-G-08.PDF>

43. Ray, n. 16, p. 8.

44. "Environmental Impact Assessment Guidance Manual for Nuclear Power Plants, Nuclear Fuel Reprocessing Plants and Nuclear Waste Management Plants", March 2010, [http://moef.nic.in/Manuals/Nuclear%20Power%20Plants\\_may-10.pdf](http://moef.nic.in/Manuals/Nuclear%20Power%20Plants_may-10.pdf)

epidemiological and health status survey of the population living within 30-km radius around the proposed site has to be conducted.<sup>45</sup> To get Energy Information Administration (EIA) clearance from the MoEF, the agencies concerned have to provide the following basic information:

- Type of nuclear plant/s proposed to be built, with a brief description of each plant.
- How many plants of each type are operating or are being built in the country?
- What are the advantages of each type of plant proposed to be built at the proposed site?
- What alternatives are available for each plant and what determined the choice made?
- How will these plants help the country and the region?
- How good is the experience in terms of safety and environmental quality from similar plants built elsewhere in the country?
- How many similar plants are planned at present at other places in the country?<sup>46</sup>

**The effectiveness of the Indian EIA process for nuclear facilities has been criticised on the basis of the status of the nuclear regulatory body.**

Under the EIA notification (2006) and its amendment of December 2009, it is mandatory that the EIA clearance is carried out for all nuclear activities, even if they are constructed as add-ons at existing NPP sites. In this case, these are exempted only from public consultation. If all this information provided is satisfactory and meets the determined criteria, the MoEF would clear the proposed site for the utilities to initiate construction.

However, the effectiveness of the Indian EIA process for nuclear facilities has been criticised on the basis of the status of the nuclear regulatory body – viewed as not independent – and “the extent to which public concerns

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45. Ibid., pp. 7-9.

46. Ibid., p. 59.

are incorporated into decision-making".<sup>47</sup> M.V. Ramanna highlights three loopholes in the EIA process. First, the reprocessing plants that chemically process radioactive spent fuel discharged from the nuclear reactors are not subject to the EIA process. Second, the EIA for nuclear projects is commissioned by the project authorities themselves, therefore, it may furnish only positive results to highlight the proposals in a favourable light. Third, the EIA is subject to technical errors and the environmental consultants who prepare the document, largely depend upon the nuclear establishment itself. Fourth, the provision for public consultation and hearing is not maintained in both letter and spirit, and the views of the public are allegedly ignored in decision-making. Therefore, it is alleged that the conflict of interest in the EIA process for nuclear facilities is manifold.

However, it has been overlooked that watertight compartmentalisation of different organs of the nuclear establishment and putting one organ as a check against the other would generate unnecessary factionalism and avoidable tensions. There have been many occasions where the MoEF has rejected outright the site proposals for even minor lacks in the documents furnished by the utilities. Criticism is advanced against the organ of the government in charge of the safety and security of nuclear projects; but there would also be criticism if the government were to distance itself from such projects, promoting independent organisations to deal them instead. The problem, in fact, seems to be lack of trust in government organs that are in charge of nuclear activities and this is precisely because of the lack of adequate nuclear information dissemination, not lack of capability to streamline and regulate the activities.

### *Disaster Resistant Design and Construction*

On the basis of a conservative assessment, two levels of seismic parameters – Safe Shutdown Earthquake (SSE) and Operating Basis Earthquake (OBE) – are prescribed for a nuclear plant. Once the parameters are decided, *design*

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47. M.V. Ramanna and Divya Badami Rao, "The Environmental Impact Assessment Process for Nuclear Facilities: An Examination of the Indian Experience", *Environment Impact Assessment Review*, 30 (2010), p. 268.

*response spectra and acceleration time history*,<sup>48</sup> which comprise basic input information for seismic design of structures, are derived. In the absence of detailed past history of earthquakes, Zero Period Ground Acceleration (ZPA)<sup>49</sup> is specified as half of the SSE level.<sup>50</sup> For the purpose of evolving the design, all structures, systems and components of a nuclear plant are classified into three seismic categories, according to their safety requirements. These are Categories 1, 2, and 3 structures, corresponding to the seismic design requirements of SSE, OBE and Bureau of Indian Standard's provisions respectively.

**As per the guidelines, even if the candidate plant does not fall under any high seismic zone, it has to be designed to withstand a minimum seismic level.**

As per the guidelines, even if the candidate plant does not fall under any high seismic zone, it has to be designed to withstand a minimum seismic level. The current practice is to prescribe a minimum value of 0.10g as zero period acceleration for which a nuclear power plant needs to be designed.<sup>51</sup> The modelling of the plant structure is a process of mathematical idealisation which represents the distribution of mass and rigidity of all elements as accurately as possible. Normally, the two types of model – lumped mass stick model and 3D space frame finite element model – depend on the geometry of the structure planned at the candidate site.<sup>52</sup> (This finite element model is

48. "Seismic design is traditionally performed for most common structures by the means of equivalent lateral static loading or modal spectrum analyses. Nevertheless, time history analyses are required to define real seismic response of structure especially for irregular, highly ductile, critical or higher modes induced structures. Seismic codes specify design spectra for the purpose of the design of buildings and recommend scaling of selected ground motions matching spectral acceleration within the period range of interest to use in the time history analyses." Y.M. Fahjan, Z. Ozdemir and H. Keypour, "Procedures for Real Earthquake Time Histories Scaling and Application to Fit Iranian Design Spectra", International Institute of Earthquake and Engineering and Seismology, [http://sismik-guclendirme.com/Fahjan%20et%20al-%20SEE5-2007-Procedures%20for%20Real%20Earthquake%20Time%20Histories-Formatted-Final01\\_makale2.pdf](http://sismik-guclendirme.com/Fahjan%20et%20al-%20SEE5-2007-Procedures%20for%20Real%20Earthquake%20Time%20Histories-Formatted-Final01_makale2.pdf), p. 1.

49. ZPA is the response acceleration value when the structure is very rigid and there is no amplification of ground spectra because of the structure. (i.e. response acceleration when time period of the structure is zero).

50. Ray, n. 16, p. 14.

51. S.S. Warudkar, "Seismic Design Considerations for Nuclear Plant Structures", *Nu-Power*, vol. 15, no. 1 to 4, 2001, p. 39.

52. Ibid.

used on the basis of analysis of the reactor building having lumped masses representing the floor and equipment masses, structural beams, and soil spring elements.<sup>53)</sup>

Examination of the seismic capability of some rotating and moving equipment like the primary shutdown mechanism, reactivity mechanism and electrical-instrumentation panels, through an analytical approach, may not be possible. Functional operability of these active devices is demonstrated by “shake-table testing” by mounting them on a shake-table.<sup>54</sup> The motion, identical to the shake-table, and functional performance is monitored during the table motion and if it fails to perform the intended function, the equipment has to be reviewed. Essential equipment, particularly the diesel generators, are kept at a suitable elevation to avoid flooding. Embankments, wave brakes and boundary walls have been designed accordingly to mitigate any influx of water into the plant premises.

The design of the civil structure of the plant is also analysed by performing a response spectrum analysis as per national international codes. Various international codes like those of the American Society of Mechanical Engineers (ASME), Institute of Electrical and Electronics Engineers (IEEE), American Society of Civil Engineers (ASCE), American National Standards Institute (ANSI), etc. are used in the seismic design of the plants. Also, over the years, indigenous expertise has been developed at the Nuclear Power Corporation India Limited (NPCIL), Bhabha Atomic Research Centre (BARC) and several other research institutes and laboratories in the areas of seismic design, analysis and shake-table testing.<sup>55</sup>

Both coastal and inland sites may be prone to location-specific disasters and, therefore, are designed differently (Figs 4 and 5). The AERB Safety Guide (AERB/NPP/SG/S-8) stipulates plant design criteria for an

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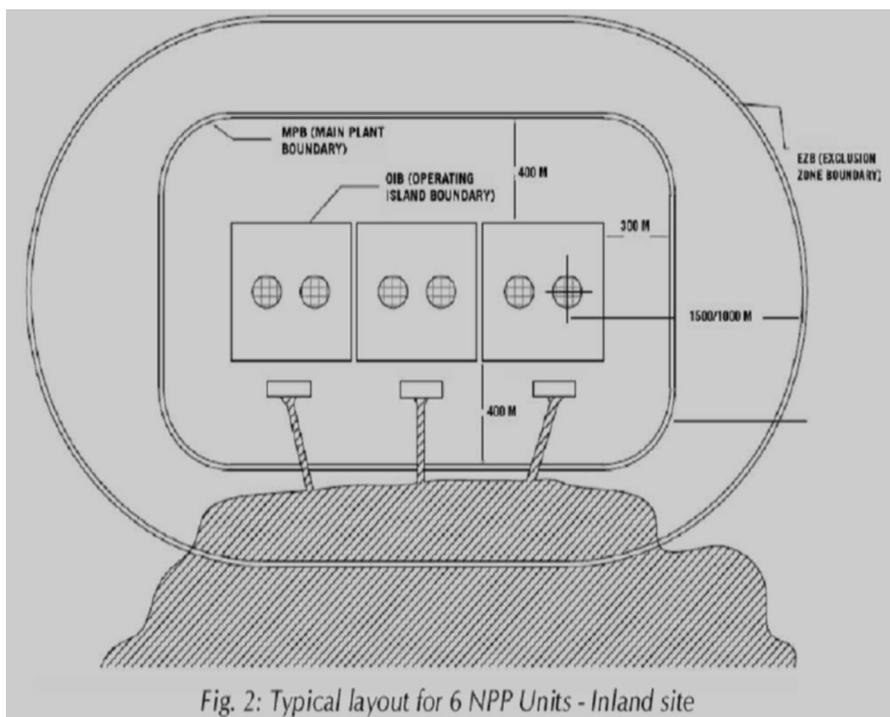
53. S.A. Bharadwaj, “Broad Steps in Earthquake Resistant Design of a Nuclear Power Plant”, *Nu-  
Power*, vol. 15, no. 1-4, 2001, p. 32.

54. *Ibid.*, p. 35.

55. *Ibid.*, p. 36.

emergency situation and disaster management.<sup>56</sup> The “zoning” concept is followed to ensure emergency preparedness. Generally, three zones are defined for control of the population. The innermost Exclusion Zone (EZ) that surrounds the plant is directly under the control of the plant. The second zone, an annulus around the EZ zone, defines the Sterilised Zone (SZ) where growth of population and habitation is limited and monitored by administrative control. The outermost zone, the Emergency Planning Zone (EPZ), defines the minimum distance to a high population centre. The Indian siting code prescribes an exclusion area of 1.5 km radius around the plant.<sup>57</sup>

**Fig 4: Plant Design for Inland Sites**

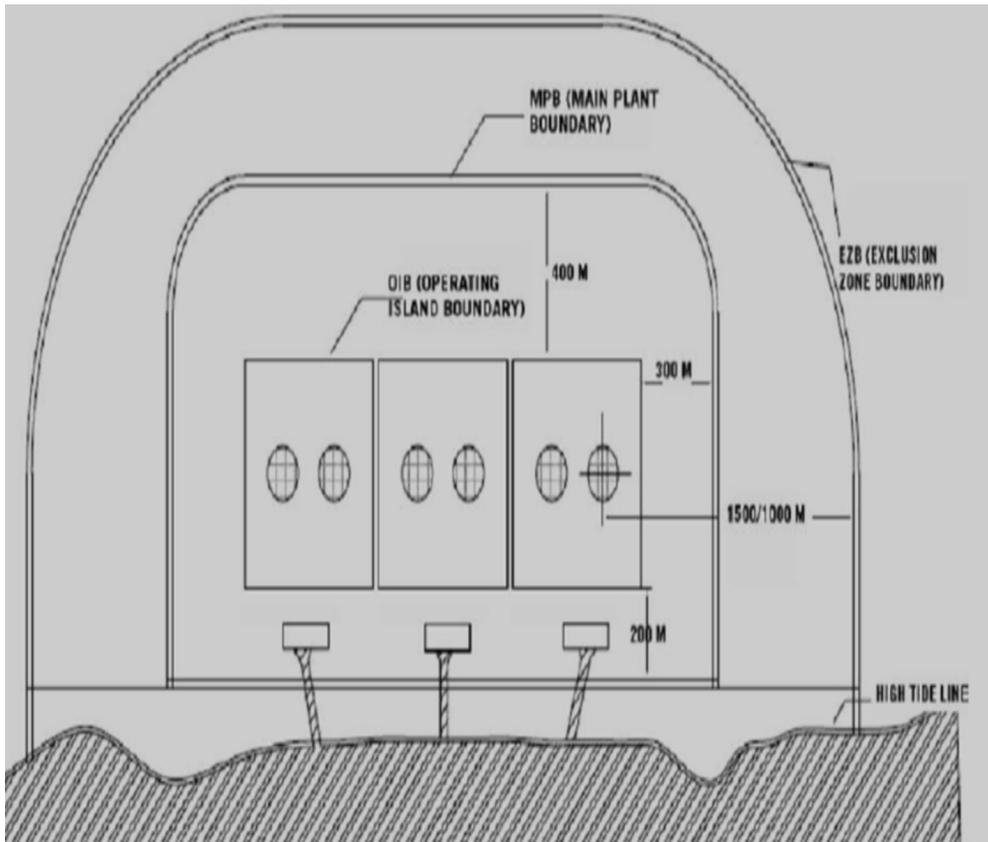


Source: M.N. Ray, Hand Book on Site Selection Process, NPCIL, 2010, p.19

56. AERB, Site Considerations of Nuclear Power Plants for Off-Site Emergency Preparedness, October 2005, <http://www.aerb.gov.in/T/PUBLICATIONS/CODESGUIDES/S-8.PDF>

57. Ibid.

Fig 5: Plant Design for Coastal Sites



Source: M.N. Ray, Hand Book on Site Selection Process, NPCIL, 2010, p.18.

### *Quality Assurance*

During the life-time of the nuclear plant, stringent quality of management, construction and maintenance is ensured to eliminate any eventuality. The AERB Safety Guide on *Quality Assurance in Nuclear Power Plants* enumerates specific and comprehensive quality control codes to be adhered to during every activity. The quality assurance programme includes the organisational structure, functional responsibilities, levels of authority and interfaces for those managing, performing, assessing and improving the adequacy of

the process.<sup>58</sup> It addresses the management process, including planning, scheduling, resource considerations, environmental and security aspects.

The NPCIL which operates all nuclear plants in the country ensures that the top management is committed to quality, safety and reliability and enforces them in all phases of the plant(s) by creating an appropriate organisational structure and providing resources with the requisite delegation of authority.<sup>59</sup> The quality assurance directorate and heads of the units have the responsibility to ensure effective implementation of the management system requirements at the project sites, operating nuclear plants and supporting organisations. They are authorised for suspension of work in the event of significant deviations in the processes and related activities, when noticed, till they are resolved.<sup>60</sup>

The Civil Liability for Nuclear Damage Act, 2010, fixes the nuclear damage liability with the operator of the nuclear installation (Chapter II, 4(1)).<sup>61</sup> This provision, in a way, directs the operator to ensure the quality, safety and security of nuclear materials, installations and operation throughout. In turn, the operator will bilaterally stipulate the liability with the supplier for the components or technology supplied.

On the basis of the sub-committee reports, state government data, seismotectonic assessment report, geotechnical report, and ecosensitivity report, a composite report is prepared on the feasibility of a nuclear power plant at the candidate site. The objective of such a cumbersome process simply is to ensure the safety, security and accountability of each activity undertaken.

## THE POST-FUKUSHIMA ASSESSMENT

Partly owing to the global concern over nuclear safety and partly due to the resentment over the proposed Jaitapur nuclear plant, the Indian nuclear

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58. AERB, "Quality Assurance in Nuclear Power Plants", <http://www.aerb.gov.in/T/PUBLICATIONS/CODESGUIDES/SG-S-10.PDF>, January 16, 2009.

59. S.K. Jain, "Statement Of Policy And Authority", [http://www.npcil.nic.in/main/Quality\\_policy.aspx](http://www.npcil.nic.in/main/Quality_policy.aspx)

60. Ibid.

61. *The Civil Liability for Nuclear Damage Act, 2010*, No. 38 of 2010, *The Gazette of India*, Ministry of Law and Justice, New Delhi, available at <http://www.dae.gov.in/rules/civilnucliab.pdf>, p. 4.

energy debate in the post-Fukushima period seems to reflect three important issues: (1) the findings of the safety audit of nuclear facilities undertaken; (2) the status of the proposed new Nuclear Regulatory Authority; and (3) amicable settlement of the grievances of the Jaitapur public where a nuclear power plant has been planned.

Even though the Indian seismotectonic map is different from that of Japan and simultaneous occurrence of an earthquake and tsunami/flooding is not expected here, a safety audit of all nuclear power stations by the Department of Atomic Energy (DAE) and the Nuclear Power Corporation of India Ltd. (NPCIL) was ordered by Prime Minister Manmohan Singh.<sup>62</sup> Six high-level task forces were constituted with the mandate to investigate the safety status of, and loopholes in, Indian nuclear installations, and to devise an appropriate strategy to address them. The interim Four Task Forces Combined Report says that “adequate provisions exist at Indian nuclear power plants to handle station blackout situation and maintaining continuous cooling of reactor core for decay heat removal”.<sup>63</sup>

During the reevaluation, extreme external natural events like an earthquake and tsunami/flood were considered. Generally, the safety features of Indian NPPs are designed for an earthquake with a return period of 10,000 years.<sup>64</sup> According to the first level evaluation (Table 2), the seismic margin of the majority Indian NPPs is close to 0.6g Peak Ground Acceleration (PGA).<sup>65</sup>

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62. “Safety Review Ordered in Nuclear Plants: Manmohan”, *The Hindu*, March 14, 2011.

63. NPCIL, “Safety Evaluation of Indian Nuclear Power Plants Post Fukushima Incident” (Interim Report), Four Task Forces Combined Report, 2011, p. iii

64. *Ibid.*, p. 7

65. *Ibid.*, p.9.

Table 2: Assessment of Seismic Margin

Station	Seismic Zone	Magnitude (Richter Scale)	Epicentral Distance (km)	Design PGA (g)	Conservative Margin (PGA) (g)
TAPS 1,2	III	5.7	16	0.2g	0.337 to 1.83 @
RAPS-1,2	II	6.0	40	0.1g	0.233 to 2.26 @
MAPS-1,2	II	6.0	20	0.156 g	0.233 to 2.26 @
NAPS-1,2	IV	6.7	12	0.3g	0.6 #
KAPP-1,2	III	6.5	30	0.2g	0.6 #
KGS-1,2,3,4	III	5.7	12	0.2g	0.6 #
RAPS-3,4,5,6	II	6.0	40	0.1g	0.6 #
TAPS-3,4	III	5.7	16	0.2g	0.337 to 1.83 @

@ Seismic requalification based; # Observation/performance based

Source: NPCIL, "Safety Evaluation of Indian Nuclear Power Plants Post Fukushima Incident" (Interim Report), Four Task Forces Combined Report, 2011, p. 9.

In regard to events like tsunami and flooding, originally the TAPS-1&2, RAPS-1&2 and MAPS-1&2 plants were not designed to withstand a tsunami and upstream dam break conditions. However, subsequent upgradation of these reactors is claimed to enhance the safety levels to effectively manage a Station Blackout (SBO) event. The comprehensive safety review of TAPS-1&2 in 2005 examined the station operating performance, safety analysis, ageing assessment and management, structural integrity and plant seismic studies to meet the current safety principles and practices.<sup>66</sup> The latest reevaluation postulated the flood levels and margins due to a tsunami and upstream dam break and advised reassessment of three facilities – TAPS-1&2, RAPS-1&2, and MAPS-1&2 (Table 3).

66. "Task Force Report of TAPS-1&2 (A1)", Safety Evaluation of Indian NPPs Post Fukushima Incident, Reports of the Task Forces, 2011, p. A1: 2.

**Table 3: Postulated Flood Levels and Margins**

<b>Station</b>	<b>Original designed flood level (in metres)</b>	<b>Revised levels taken for assessment (in metres)</b>	<b>Emergency power DGs elevation (in metres)</b>	<b>Margin available (in metres)</b>
TAPS-1&2	29.33	31.10*	32.30	1.20
RAPS-1&2	354.20	359.60**	356.6 (Original DGs) 366.6 (Retrofitted DG)	7.00
MAPS-1&2	8.96	10.50*	10.67 (Original DGs) 12.5 (Retrofitted DG)	0.17 2.00
NAPS-1&2	180.80	Design is adequate-revision not required	187.30	6.50
KAPS-1&2	50.30	Design is adequate-revision not required	51.30	1.00
RAPS-3&4	359.60	Design is adequate-revision not required	384.30	24.70
RAPS-5&6	359.60	Design is adequate-revision not required	393.30	33.70
KGS-1&2	38.90	Design is adequate-revision not required	41.30	2.40
KGS-3&4	38.90	Design is adequate-revision not required	41.60	2.70
TAPS-3&4	31.10	Design is adequate-revision not required	32.30	1.20

Source: NPCIL, "Safety Evaluation of Indian Nuclear Power Plants Post Fukushima Incident" (Interim Report), Four Task Forces Combined Report, 2011, p. 10.

To further augment the safety levels, the task forces have advised a series of additional arrangements. They include: automatic reactor shutdown in case of any seismic activity; inerting of the TAPS-1&2 containments; increasing the duration of the passive power sources/battery operated devices; hook-up arrangements through external sources for adding the cooling water inventory to the primary heat transport system; augmentation of the water inventory; training programmes for plant personnel; additional shore protection measures; and additional hook-up points for making up water to spent fuel storage pools wherever necessary for ensuring sufficient inventory.<sup>67</sup>

The task force, while highlighting the adequacy of the existing provisions at TAPS-1&2 to mitigate SBO situations due to external events, has recommended a series of short- and long-term measures taking into

67. NPCIL, n. 63, pp. iii-iv.

account the consequences of postulated events related to an earthquake and tsunami. It recommends self-sufficiency provisions for handling emergencies for seven days without external help; additional training, mock-up drills and disaster management training of personnel need to be hastened.<sup>68</sup> In the long-term, the automatic SCRAM sensing earthquake mechanism needs to be installed. To ensure reliable electric power supply, a tsunami resistant thick wall around the deisel generators and diesel tank need to be raised and CNG/gas operated generators should be placed at adequate elevation outside the plant.

The task force on RAPS-2, while recognising the availability of systems and procedures to assure core cooling, has recommended further improvements in five areas: (1) augmentation of water resource; (2) augmentation of feed/make up capability; (3) extension of power sources; (4) improvement in the system; and (5) augmentation of long-term resources.<sup>69</sup> Specifically, the task force has recommended that a dousing tank of 1,800 cu mt capacity and three additional portable diesel pumps to pump water to boilers against 4 kg/cm<sup>2</sup> should be made available.<sup>70</sup> The task force on MAPS had suggested strengthening of the existing firewater line, an underground concrete tank of 750 cum., solar powered lighting for buildings, hydrogen management devices, engineering of liquid nitrogen packs and suppression pool water inventory.<sup>71</sup> How stringently and efficiently these recommendations will be implemented is a matter of conjecture. When corruption has engulfed all sectors, the pertinent question is: "Can corrupt India handle nuclear safety"?<sup>72</sup>

### **THE PROJECT AFFECTED FAMILIES REHABILITATION**

The most important aspect of nuclear projects is the 'public acceptance' which depends upon various factors relating to the nuclear plant site and operation. Suitable rehabilitation of the displaced people and the safety

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68. n. 66.

69. *Ibid.*, p. A2: 5.

70. *Ibid.*, p. A2: 6.

71. *Ibid.*, p. A3: 8-9.

72. Brahma Chellaney, "Can Corrupt India Handle Nuclear Safety?", <http://www.rediff.com/news/column/india-corruption-nuclear-safety/20110318.htm>, March 18, 2011.

**The politics involved and the vested interests in the opposition to any nuclear activity, raise many confusing issues to instigate the public. As a result, no rehabilitation package works.**

of the surrounding population constitute the most pressing among other issues. In India, generally, land acquisition for mega projects has faced public opposition, leading to project delays and cost overruns. Perceptibly, this is owing to mismatch of expectations among the various parties involved: the people, the developers and the regulators. According to M. Shashidhar Reddy, the Vice Chairman of the National Disaster Management Authority (NDMA), rehabilitation of Project Affected Families (PAF) in the country is not being done properly.<sup>73</sup>

With the expedition of new nuclear power projects, public resentment regarding nuclear projects is starting to surface in India. A number of allegations have been raised by the local population. For example, many facilities were shifted 10 km away from the seashore in Kopran village in Tarapur but were not looked after adequately. The Bombay High Court, on the approach of the villagers, has directed the state government to consider giving better fishing facilities and coastal land to the 53 families who have been given alternative accommodation on account of the Tarapur nuclear power project.<sup>74</sup> Even the NDMA has reportedly found loopholes in the relief and rehabilitation package offered to the villagers affected by the Tarapur atomic power station.<sup>75</sup> The opposition to the Jaitapur nuclear power plant project seems to have been triggered on the basis of environmental safety and rehabilitation concerns of the local population. Also, the politics involved and the vested interests in the opposition to any nuclear activity, raise many confusing issues to instigate the public. As a result, no rehabilitation package works. For example, the local residents opposed to the Jaitapur Nuclear Power Plant (JNPP) have refused to accept

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73. "Rehab of Project-Affected People not in Right Direction: NDMA", <http://news.in.msn.com/national/article.aspx?cp-documentid=5258689>

74. Mustafa Plumber, "Look into the Needs of Tarapur PAPs, Bombay High Court Tells Govt", <http://dnaindia.com>, September 9, 2011.

75. "Loopholes in Tarapur Nuclear Plant Rehab Package, Says NDA", [www.dnaindia.com](http://www.dnaindia.com), July 3, 2011.

any compensation, and have not even demanded an increase in compensation. The government has unilaterally offered civic amenities, including the offer to increase the compensation of Rs. 25 lakh per hectare each to the families for 938 hectares of land.<sup>76</sup>

The problem, in fact, lies in the lack of understanding of nuclear power's potential, the government's concerns for safety, and the public perception on anything nuclear. Generally, "science, technology and society constitute a dynamically interactive triad, each steadily growing and influencing the other two in new ways. ... Society is not just the passive partner arbitrarily unsettled by the progress of science and technology. History is witness as to how active social choices have steered the course of science and technology" and vice-versa.<sup>77</sup> What needs to be done is streamlining and nurturing of a strict technological culture through full public scrutiny to help allay both government and public concerns in all these contentious issues.

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## CONCLUSION

However, the *modus operandi* for siting of nuclear facilities in India has never been overlooked; rather a concerted effort is always in place to implement these mandates, to ensure safety and emergency preparedness for mitigation of postulated events. Even the peninsular shield of India, which is considered free from severe seismic activity, has been scrupulously examined before siting any nuclear plant there. While all international norms and standards are followed and adopted, an indigenous technology base for all facets of nuclear activity is attempted, taking into account India's

76. Sanjay Jog, "Maharashtra Mulls Annuity Payments for Jaitapur-Affected Families", <http://www.business-standard.com/india/news/maharashtra-mulls-annuity-payments-for-jaitapur-affected-families/446597/>, August 22, 2011.

77. Vinod K. Gaur, "Why this Seminar?", in Vinod Gaur, ed., *Nuclear Energy and Public Safety* (Indian National Trust for Art and Cultural Heritage, 1996), p. ix.

and the regional geology and meteorology. Both historical and instrumental data are collected and analysed. As the available seismic history of India is short, Micro-Earthquake (MEQ) monitoring<sup>78</sup> is conducted to augment the limited seismological database to ascertain the seismicity of the area and to carry out seismotectonic studies.<sup>79</sup> The seismic monitoring, according to AERB Guidelines (50SG-S11; 1990, Appendix-D), should be started well before (3-5 years) the construction of a nuclear power plant. Once a facility is established, the Environmental Survey Laboratory (ESL) stationed around the facility gathers environmental samples on an hourly basis for analyses.

However, seismic and meteorological events have been occurring in India and elsewhere in the world from time immemorial and no location can be described as 'not susceptible' to their occurrence. Also, the fathoming of cosmology by human beings would always be limited as its evolution is much older than the evolution of the human mental faculty. The effort rather is to accumulate data as vast as possible to locate the pattern while getting ready for every postulated event. This is applicable to every industrial undertaking, including nuclear. However, the problem specific to nuclear projects is their popular image and perception which at the moment seem blurred and disproportionate. The public panic based on the idea that 'nuclear activity anywhere is a threat to humanity everywhere' seems to be misplaced, overemphasised, and in the process, the *specificities of nuclear projects* in different parts of the world are overlooked.

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78. The MEQ system, a powerful state-of-the-art instrument, consists of a tri-axial sensor (one vertical and two horizontal) and a three-channel digital recorder. The system can provide the approximate direction of the source in addition to the information provided by the one-component station. This system is already commissioned at TAPS and is working satisfactorily. R. Bharadwaj, "Micro-Earthquake Instrumentation at TAPS", *Nu-Power*, vol. 18, no. 1 2004, p. 56.

79. *Ibid.*, pp. 55-56.

# CHINA'S NAVAL STRATEGY: STRATEGIC EVOLUTION AND EMERGING CONCEPTS OF WARFARE

SHIKHA AGGARWAL

Throughout modern history, the symbiotic relationship between the rise of global powers and the emergence of a strong naval component to their security strategies appears to be a thematic rule.

As China continues to rise as a political, economic and military power in the international order, its national interests are bound to grow, and assume a global character. A potent dimension of these growing national interests is going to be manifested in the 'seas' – an arena encompassing security, economic, and nationalistic concerns for the Chinese. Also, the ability to operate in the world waterways would allow China to enhance its influence in shaping the order of emerging world politics. As such, any naval strategy would be a multi-faceted approach.

This paper attempts to analyse the naval-military dimension of China's growing national interests, and thereby chart a naval strategy for the People's Liberation Army-Navy (PLAN). As any strategic construct is rooted in a host of historical and cultural factors, the paper endeavours to locate a strategy for the PLAN within the dynamics of the changing security perception, doctrinal evolution, and capabilities orientation.

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## LOCATING THE 'SEAS' IN CHINA'S STRATEGIC THINKING

Unlike the ancient strategic construct of continental defence, modern-day China recognises that correct knowledge of the sea, and safeguarding sea territory and national maritime interests have a strong bearing on a nation's rise and decline, and "prosperity of the motherland."<sup>1</sup>

At 14,500 km, China has one of the longest coastlines in the world. Factors of geography render this coastline a very peculiar character—the shape of China's coastline is widely extended from north to south, but extremely shallow from east to west. As such, China's defence depth along its coastline becomes extremely shallow due to numerous islands in the Pacific Ocean. According to Chinese scholar Xu Qi<sup>2</sup>, **threats to nations' security interests often increase as their spatial distance decreases. The vast expanses of the ocean, thus, establish a direct relationship between maritime geo-strategic positions and national security interests.** Furthermore, the National Defence White Paper 2004 clearly states that the PLAN aims at establishing "command of the sea". Conceived in such strategic thinking, it becomes imperative for the Chinese Navy to seek avenues to deepen its depth of defence and create as large a space for fleet manoeuvrability as possible.

Along with geography, the **context of geographic orientation<sup>3</sup> further complicates the issue of naval strategy for China:** China has disputes with regard to claims over territorial waters with almost all its neighbours—with Brunei, Malaysia, the Philippines, Taiwan and Vietnam over the Spratly and the Paracel Islands in the South China Sea, and with Japan over the Senkaku or Diaoyu Islands in the East China Sea. Territorial or territorial related disputes, if not settled amicably or through peaceful negotiations,

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1. Shen Shungen and Yang Dechang, "Each China Sea Fleet Conducts Education in 'Outlook on Sea' Among Units, Boosting Enthusiasm of Officers and Men For Building Powerful Navy," *Jiefangjun Bao*, December 16, 1989, p.1. Cited here from *Joint Publication Research Service, China (JPRS-CAR-90-011)*, February 12, 1990, p.63.
  2. Xu Qi, "Maritime Geostrategy and the Development of the Chinese Navy in the Early Twenty-First Century," translated by Andrew S. Erickson and Lyle J. Goldstein, *US Naval War College Review*, vol.59, no.4, Autumn 2006, pp. 47-67. The article was first published in *China Military Science*, vol.17, no.4, 2004, pp. 75-81. Xu serves as a Senior Captain in the PLA-Navy. In the article, he asserts that China's existence as a nation, its development, and great resurgence, all increasingly rely on the sea.
  3. The phrase is defined as "geographical relations among the nations." *Ibid.*

have a high potential to lead nation-states into armed conflicts or eventful wars<sup>4</sup>. These disputes are further complicated by historical, cultural, political, military and economic factors. The phenomenon of nationalism acts as a major force in aggravating the issues related to territorial disputes. Since, China regards these disputed waters as its historical claims, it perceives future threats to its territorial integrity and sovereignty as emanating from the sea.

In order to chart a naval strategy for a country, it is necessary to explore the importance accorded to the sea in a nation's strategic security thinking—both contemporary and historical. Nuanced approaches to the study of strategic culture<sup>5</sup> would further guide us towards the country's strategic behaviour with regard to issues related to the seas: China, for the most of its history, faced security threats from the northern and western frontiers. As such, **successive dynasties in China gave primacy to land security over maritime security** and focussed national resources on building up the Great Wall. China's self-image as the "centre of the world," and foundation of a self-sufficient agricultural economy further degenerated any incentive for a maritime strategy in the Chinese strategic thinking<sup>6</sup>. But, in spite of these strategic preferences, **China had a substantial naval component to its security strategy, particularly during the Song (AD 960-1279), the Yuan (1271-1368),**

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4. Tuomas Forsberg, "Explaining Territorial Disputes: From Power Politics to Normative Reason", *Journal of Peace Research*, vol. 33. no. 6, 1996, p.443; see also Catley and Makmur Keliat, *Spratlys: The Dispute in the South China Sea*, 1997. According to the authors, there were 86 serious international conflicts between 1919 and 1975, and of this number, 39 originated from territorial disputes.

5. Strategic culture is defined as "the body of attitudes and beliefs that guides and circumscribes thought on strategic questions, influences the way strategic issues are formulated, and sets the vocabulary and perceptual parameters of strategic debate," Jack Synder, *The Soviet Strategic Culture: Implications for Nuclear Options* (Santa Monica, Calif: RAND, 1977), p.9.

6. Ibid.

and the Ming (1368-1644) Dynasty periods”<sup>8</sup>. The navy was completely degenerated during the Qing Dynasty period (1644-1912). Some scholars attribute the neglect of the navy by the Qing rulers to the dominance of the Confucius ideology in the Chinese strategic thinking during this period.<sup>9</sup>

One of the Ming texts on strategy and statecraft, *Cao Lu Jing Lue*<sup>10</sup> lays down a strategy for combating coastal pirates: “Defending against their landing (on shore) is not as good as defending against them at sea. Defending against them in coastal waters is not as good as heading out to sea and defending them outside the coastal waters.” Analysed under the nuances of modern military lexicon, the author of the text can be clearly perceived as arguing for an offshore strategy for the naval forces to deal with security threats. **As such, this ancient text serves as proof of the existence of a ‘sea-going’ strategy in Chinese military strategic thought.**

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7. The Song Dynasty (AD 960-1279) deployed the world’s most powerful and technologically advanced navy. In fact, the Song regime was the first in China to establish a permanent national navy as an independent Service, administered by a central government agency. China remained a sea power during the rule of two succeeding dynasties: the Yuan (1271-1368), and the Ming (1368-1644). While the Yuan used large fleets to undertake invasions of Vietnam, Java, and Japan, the Ming Dynasty’s most notable naval achievement perhaps remains Zheng He’s “Treasure Fleet” voyages undertaken from 1405 to 1433. These voyages are divided into three groups: the first group comprised the first (1405-07), second (1407-09), and third (1409-11) voyages targeted at reopening the Strait of Malacca, and reinitiating contacts in the Indian Ocean; the second group includes the fourth (1413-15), fifth (1417-19), and sixth (1421-22) voyages that expanded Ming trade and diplomatic contacts to the Middle East and East Africa; the seventh voyage (1431-33) retraced earlier voyages as far as Hormuz and sent out smaller contingents to East Africa. For a detailed discussion on the subject, refer, Andrew R. Wilson, “The Maritime Transformation of Ming China,” Ch. 1, Part III, *Chinese Maritime Transformations*, in Andrew S. Erickson, Lyle J. Goldstein and Carnes Lord, eds., *China Goes to Sea: Maritime Transformations in Comparative Historical Perspective* (Maryland: US Naval Institute Press, 2009), and Bernard D. Cole, “The Organization of People’s Liberation Army Navy (PLAN).”
  8. Though it is widely held that Zheng He’s “Treasure Fleet” was not driven by expansionist tendencies, Andrew R. Wilson maintains that the voyages were, in part, directed towards advertising the rising military and economic power of the Ming Dynasty to the coastal and island kingdoms of the South China Sea and the Indian Ocean. The military power in this case was clearly meant to overawe, coerce, or compel these states. Further, the economic dimension of the voyages was concerned with expanding the existing Chinese trade links with the coastal kingdoms.
  9. Cole, n. 7.
  10. Although the author of this text is unknown, scholars believe that it appeared some time in the early Wan Li period. In general, the text argues that force is necessary to deal with external threats. Though it does exhibit some of the language of the Confucian-Mencian strategic discourse. Cited here from Alastair Ian Johnston, *The Parabellum Paradigm and the Ming Security Problematique* (UK: Princeton University Press, 2005).

Further, the Opium Wars exposed imperial China's military weakness to attacks from the sea and led to the so-called "century of humiliation," wherein the Chinese continuously suffered political and military subjugation at the hands of the Japanese and the Western powers. As a consequence of this, upholding China's territorial integrity and sovereignty still ranks as a priority in Chinese military-strategic thinking.<sup>11</sup> Therefore, since China has been able to resolve most of its territorial disputes with the neighbouring states, except for India, ensuring the security of its maritime interests and claims becomes the natural extension of the concept of maintaining national integrity.

**National Defence White Paper 2010 states that China "would continue to map out economic development and national security in a unified manner..... to realize the unified goal of building a prosperous country, and a strong military."**

#### **MODERN MARITIME POWER**

According to Ni Lexiong,<sup>12</sup> when a nation embarks upon a process of shifting from an "inward-leaning economy" to an "outward-leaning economy," the arena of national security concerns begins to move towards the oceans.

Since the advent of the Four Modernisations programme, economic and strategic concerns play a crucial role in driving China's national policies. **The deepening co-relation among economics, national security goals and military strategy in Chinese strategic thinking** is best exemplified in the National Defence White Paper 2010. which states that China "would continue to map out economic development and national security in a unified manner.....to realize the unified goal of building a prosperous country, and a strong military." The maritime dimension of this evolving strategic construct finds resonance in the National Defence White Paper

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11. This is exemplified by the fact that China's National Defence White Papers, published since 2000, maintain upholding Chinese territorial sovereignty and integrity as its core national interest. For details see, China's National Defense in 2010, published by the Information Office of the People's Republic of China, Beijing, March 2011.

12. Ni Lexiong, "Sea Power and China's Development."

2006. The paper clearly recognises access to raw materials and various media upon which economic development depends as a major national security concern, and notes, "Security issues related to energy, resources, finance, information, and international shipping routes are mounting." This emphasis upon economics as the cornerstone of national security concerns is ultimately leading China to focus its attention upon securing its Sea Lanes of Communication (SLOCs) with the Middle East and Africa.

The notion of securing economic interests is gradually giving rise to the concept of "security boundary"<sup>13</sup> within the Chinese strategic thinking. The idea of "security boundary" entails that **once a nation-state takes part in globalisation, it has the right to protect those national interests that have been integrated into the world.** As such, China's national interests "may not only involve all the regions of the world but could even include outer space."<sup>14</sup> Therefore, in order to safeguard its ever expanding national interests, China should develop substantial military and strategic capabilities. Within the context of these developments, expansion of Chinese naval power becomes an obvious consequence.

On February 25, 1992, the National People's Congress passed the **Law of the Territorial Sea and Contiguous Zone.**<sup>15</sup> This law defined the range of China's territorial sea and contiguous zones as 24 four nautical miles—twelve for the territorial sea, and twelve for the contiguous zone, extending from the baseline of the territorial sea. Article 2 of the law states, "The territorial sea of the People's Republic of China (PRC) is the sea areas adjacent to the PRC's land territories and internal waters. The land territories of the PRC include: PRC mainland, and coastal islands: Taiwan and nearby islets including the Diaoyutais (Senkaku Shoto); Penghu Islands (Pescadores); the Dongsha (Pratas); Xisha (Paracel), Zhongsha (Macclesfield Bank), and Nansha (Spratly) archipelagoes; and all the islands belonging to the PRC."

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13. Z. Wenmu, "Sea Power and China's Strategic Choices," *China Security*, Summer 2006, pp.17-31.

14. *Ibid.*

15. Cited here from Alexander Chieh-cheng Huang, "The Chinese Navy Offshore Active Defense Strategy, Conceptualizations and Implications," *US Naval War College Review*, vol. XL VII, no. 3, Summer 1994, pp.7-32.

An interesting feature of this law is that it links China's sea rights to its perceived national interests.<sup>16</sup> According to the senior PLA Col, L. Yijian<sup>17</sup>, the idea of sea rights in the Chinese context does not have any geographic limit. It legitimises the PLAN's efforts to achieve a degree of freedom of movement in key global waterways. Also, the concept of sea rights is considered as being integral to the notion of sea power.<sup>18</sup> As such, it can be inferred that **the concept of sea rights is an open-ended notion in the Chinese strategic thinking, and includes "all maritime areas that have an important bearing on China's national security and fall within the PLAN's effective reach."**<sup>19</sup>

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Since it became a net importer of oil in 1993, China's dependence on natural gas and oil to sustain its economic growth has been increasing rapidly.<sup>20</sup> Therefore, **as the land resources are getting fast depleted, the sea serves as the most important strategic space for sustainable development.** The Spratly Islands in the South China Sea are often dubbed as the "second Persian Gulf"<sup>21</sup> due to their perceived estimated potential for

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16. For an understanding of the PRC's core national interests, see China's National Defense in 2008, Information Office of the State Council of People's Republic of China, Beijing, 2009.

17. L. Yijian, Senior Colonel PLA, *The Command of the Sea and the Strategic Employment of Naval Forces* (Beijing: The PLA National Defence University Press, 2004), p. 2003. Col Liu teaches at the PLAN Command College. Cited here from You Ji, "The Indian Ocean and China's Naval Build-up," in Ravi Vohra and P.K Ghosh, eds., *Indian Ocean Region* (New Delhi: Anamaya Publishers, 2008).

18. Wenmu, n. 13, pp.17-31.

19. "The Chinese Aegis Destroyers Mark the Subtle Changes in the PLAN's Offshore Water Strategy," January 20, 2005, [www.wforum.com/specials/articles/07/12989.html](http://www.wforum.com/specials/articles/07/12989.html)

20. According to the US Department of Energy data, China's oil demand will increase to more than 14 million barrels per day (mbd) by 2025. The country's natural gas demand is also expected to reach 300 billion cubic metres (bcm) by 2030. Moreover, as per a report published in 2007 by the Ministry of Land and Resources, the country's oil reserves might last only 11 years if output volume stabilises at 2006 and no new reserves are found. For a detailed discussion on the topic, see Shebonti Ray Dadwal, "China's Search For Energy Security: Emerging Dilemmas".

21. Li Mingjiang, "China's South China Sea Policy: Claims and Changing Contexts."

oil and natural gas reserves. Also, China has recently gained the approval of the International Sea-bed Authority (ISA) to undertake deep sea mineral exploration activities in the southwestern Indian Ocean<sup>22</sup>. In 2001, China was granted similar rights to conduct exploration activities in the East Pacific Ocean. These developments, analysed from a security-strategic perspective, raise concerns regarding China's growing presence in the Indian and Pacific Oceans.

China's threat perceptions, along with the development in naval capabilities point towards a forward defence posturing by the People's Liberation Army-Navy (PLAN). The extent and nature of this forward posturing by the Chinese Navy has become the most debatable issue within the strategic community.

#### **EVOLUTION OF CHINA'S NAVAL STRATEGY**

The PLAN was established on April 23, 1949, the day the Communist forces captured the presidential building of the Nationalist government in Nanjing. **Evolution of China's navy into a 'strategic Service' has taken place within the context of several inter-related factors:** China's changing threat perceptions, which, in turn, have been driven by changes in the domestic politico-economic environment, and international political balance. The changing security environment led to modifications in China's military strategy, and a simultaneous advancement in warfare capabilities. Further adjustments between intended and acquired capabilities too generated profound impacts upon the PLAN's modernisation and its strategic scope. **Due to the dynamic nature of all these factors, evolution of China's naval strategy often exhibits a non-linear pattern.**

#### **PLAN WITHIN THE STRATEGIC CONSTRUCT OF MAO'S CHINA**

**From the time of its founding in 1949 till about the 1980s**, the PLAN remained a subservient arm to the People's Liberation Army (PLA), and, hence, limited in its strategic reach and operational scope. During this period, **the Chinese**

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22. The approval was bagged by the China Ocean Mineral Resources Research and Development Association (COMRA), and entails the exclusive exploration rights for 15 years, in approximately 10,000 sq km of area in the southwest Indian Ocean ridge.

Navy was largely viewed as a coastal defence force<sup>23</sup>, and was tasked with the defence of up to a dozen or so nautical miles (nm) of waters that extended from China's coastline and land territory of about 300 km that stretches from the coastline. This is the region where China's political and economically important cities are located.<sup>24</sup>

Naval defence during this period was largely focussed on particular straits and waterways of strategic importance, or those that could be exploited by the enemy forces to invade China by sea. These included the Strait of Bohai, which is the maritime gateway to Tianjin and Beijing, and concerns the security of China's north coast; the Strait of Taiwan, which relates to the security of China's east coast, reunification of Taiwan with the Mainland and the security of the SLOCs around the islands; and the Strait of Qiongzhou, which is central to securing Hainan Island and China's south coast.<sup>25</sup> The PLAN's organisational structure in the form of the North Sea Fleet, East Sea Fleet and South Sea Fleet correlates with the defence of the three straits and the adjacent seas.

Some of the prime factors behind this strategic construct were: the continental-defence concept dominating China's military tradition, and its articulation in the form of the people's war doctrine; the influence of the Soviet naval doctrine upon China's military thinkers; and China's immediate national security concerns.

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23. Ibid.

24. Nan Li, "The Evolution of China's Naval Strategy and Capabilities: From 'Near Coast' and 'Near Seas' to 'Far Seas,'" *Asian Security*, vol. 5, no.2, 2009, pp.144-169.

25. Ibid.

**Such capabilities orientation rendered the navy incapable of operating in waters far from home or to execute an effective forward defence.** to follow.<sup>26</sup> The doctrine of people's war<sup>27</sup> relied on overcoming China's technological inferiority with its abundance in space, manpower, and time. The doctrine emphasised on "luring the enemy in deep," and employing manpower-intensive tactics of dispersion, mobility, harassment and attrition. **As such, People's War as a doctrine was rooted in the primacy of the land forces over the naval or air forces, and, hence, entailed a limited vision for the development of an independent naval strategy.** Also,

the doctrine emphasised warfare to be conducted within the Chinese territory, and, therefore, had no scope for naval or air power missions of forward defence. Further, the Cultural Revolution of 1966 killed any incentive, whatsoever for the development of a modern navy.

**The influence of the "Soviet Young School" naval doctrine within the Chinese military-strategic dominions further restricted the navy's strategic and operational growth.** The operational guidance for the PLAN during the 1950s was a copy of the Soviet 'small battle' theory.<sup>28</sup> This guidance prescribed naval warfare to be conducted as a part of army-centred combined operations.

The Soviet model contained three major components: submarines were to be the capital ships, surface ships were for near-coast patrol missions, and naval air was to be land-based.<sup>29</sup> Such capabilities orientation rendered the navy incapable of operating in waters far from home or to execute an effective forward defence.

26. Paul H.B. Godwin, "Changing Concepts of Doctrine, Strategy and Operations in the Chinese People's Liberation Army 1978-1987," *China Quarterly*, December 1987, pp. 572-573.

27. According to the original definition, people's war "was conducted by a suppressed class or nation through mass mobilization in order to liberate itself." For a detailed discussion on people's war and its relevance to China's military strategy in the present times, see Dr. Alexander Chiech-cheng Huang, "Transformation and Refinement of Chinese Military Doctrine: Reflection and Critique on PLA's View."

28. You Ji, "The Evolution of China's Maritime Combat Doctrines and Models: 1949-2001," Paper No.22, Working Paper Series (Singapore: Institute of Defence and Strategic Studies, May 2002).

29. Robert W. Herrick, "Roles and Missions of the Soviet Navy: Historical Evaluation, Current Priorities, and Future Prospects," in James L. George, ed., *The Soviet and Other Communist Navies: The View from the Mid-1980s* (Annapolis, Md.: Naval Institute Press, 1986), pp.9-36.

Further, during the 1950s and 1960s, the central security concern for the PRC was small-scale incursions of the coastline by the Kuomintang (KMT) forces. To repel such incursions, the PLA relied more on the ground forces than the PLAN. However, the PLAN did play an important and offensive role during the amphibious-landing operations to capture inshore islands controlled by the KMT forces.<sup>30/31</sup>

By the 1960s, Sino-Soviet relations began to deteriorate and China became increasingly worried over the possibility of a Soviet naval invasion of the Chinese Mainland. This fear psychosis was further aggravated by the worldwide naval exercises undertaken by the Soviet Union around this period—known in the West as “Okean 75.”<sup>32</sup>

**To thwart a Soviet offensive from the sea, the PLAN was required to assist the land-based defence by providing counter-amphibious-landing-operations.** As China was to deal with a technologically superior enemy, the first issue to be addressed in such operations was how to survive the first wave of enemy strikes. The first phase of such operations was to “hide”, i.e. to conceal, disperse, and transfer ships to the second-line defence. This was to be accompanied by organising electronic interference and air-defence operations to simultaneously paralyse the enemy offence.

For the second phase, strikes were to be launched by establishing naval and air strike zones “within the coastal waters of several dozen kilometres” to exploit the advantages of concealment and land-based firepower support. Also, surprise attacks from multiple directions would be launched at the

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30. Ibid.

31. In October 1966, the Chinese Navy’s South Sea Aviation Corps Anti-aircraft Artillery (AAA) entered the Vietnamese territory, to conduct operations against the United States of America. The navy for this mission was part of the anti-aircraft division of the Chinese Air Force. As per the Chinese accounts, over a period of two years and five months, the Chinese Navy’s anti-aircraft gun units shot down 175 US aircraft and damaged 128 others. Though this was the navy’s first battle on foreign soil, it could not be judged as a naval battle *per se*, as the naval forces only conducted operations supportive to the air force. For details, see Ai Hongren, *An Inside Look Into the Chinese Communist Navy*, Joint Public Research Service (JPRS), China (JPRS-CAR-90-052), July 16, 1990.

32. In April 1975, the Soviet Union conducted a multi-ocean exercise on the lines of previous such exercises in 1970. These naval exercises were dubbed as **Vesna** by the Soviets and Okean 75’ by the West. The exercises conducted a series of operations in the Atlantic and Pacific regions, and involved some 200 naval ships, submarines, and numerous aircraft. For details, see Norman Polmar, *The Naval Institute Guide to the Soviet Navy* (Annapolis, Maryland: US Naval Institute, 1986), Ch. 7, pp. 37-46.

**It can be concluded that China's national security missions during the late 1970s and early 1980s were primarily focussed upon ensuring national survival in a major war with the Soviet Union.**

enemy forces. These strikes were to be conducted during the enemy's moments of vulnerability, i.e. while the enemy landing force was switching ships, removing obstacles and organising itself into columns to drive to shore. Another method was to combine barriers, including mines and engineered obstacles, with firepower to prevent the enemy from removing obstacles and from driving to shore. **As can be noted, all these war-fighting methods primarily comprise defensive and delaying tactics.**

Therefore, it can be concluded that China's national security missions during the late 1970s and early 1980s were primarily focussed upon ensuring national survival in a major war with the Soviet Union. The PLAN's role during this period was to assist the defence of the coastal flank in an otherwise continental war. Safeguarding the SLOCs or acquiring claimed bodies of water does not appear to be shaping China's national strategic concerns during this period.

As the PLAN's ships at this juncture were too small, and ill-equipped in early warning, communication, and firepower, the navy was highly dependent upon land-based intelligence and firepower support for its operations. Hence, due to a major lack in capabilities, the PLAN continued to play a secondary role to the land forces till the late 1970s.

One incident that most significantly exposed the Chinese Navy's strategic and technological shortcomings was the **Sino-Vietnam conflict of 1974** over the Paracel (Xisha) islands. As the conflict arose during the Cultural Revolution, the Chinese Navy's training was virtually in stagnation, and it had to face the enemy with inferior weapons. Moreover, **the battle served a strategic lesson to the navy that it lacked the modern warfare concept of "mastering the enemy by striking first and attacking with lightning speed."**<sup>33</sup>

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33. Hongren, n.31.

The Soviet security threat, coupled with certain other factors, initiated<sup>34</sup> a new strand within the Chinese military-strategic thinking and culminated in the form of the PLAN's first "ocean-going navy proposal." In 1975, the then Adm Xiao Jingguang submitted a report to Mao stating that the maritime defence line had to be projected relatively further away from the coastline.<sup>35</sup> Mao immediately approved the report<sup>36</sup>, and on January 24, 1977, the PLAN submarine SS 252 undertook a voyage of over 3,300 nautical miles and completed a training exercise in the Western Pacific. This event changed the Chinese Navy's traditional coast guard image and paved the way for distant-waters exercises since then. **Post this event, the PLA Navy became a *de facto* independent Service.**

#### LOCATING A STRATEGY FOR PLAN WITHIN THE DYNAMICS OF THE LOCAL WARS DOCTRINE

With the arrival of Deng Xiaoping on the Chinese political scene in 1978, China's military doctrine graduated to people's war under modern conditions. The new doctrine, along with the Four Modernisations programme provided the crucial link among economic development, national security, and science and technology in the Chinese strategic thinking. As such, economic concerns came to be recognised as an integral aspect of national security strategy.

The strategy of active defence under "modern conditions" recognised that a strategic retreat<sup>37</sup> in the initial phase of warfare would result in China losing its most productive areas to the enemy forces. Hence, China

34. According to Ellis Joffe, there were four reasons behind the navy's proposal: the first was the growing Soviet naval threat close to China's shore; the second was the rapid development of China's merchant marine and the consequent need to protect sea lanes; the third was China's growing interest in offshore oil resources and its claims over disputed islands and ocean spaces; and the fourth was the ascendance of moderate leaders in China's power structure who recognised the need for military modernisation and building up of navy. Cited here from Huang, n. 15.

35. Ibid.

36. While talking with the navy's Political Commissar, Su Zhenghua, Mao showed his little finger and said, "Our navy is like this," he then showed his thumb and said, "The navy should be like this, big, so it can terrify the enemy."

37. The strategy of active defence as conceived by Mao included three stages: the first stage covers the period of the enemy's strategic offensive and the Chinese forces' strategic retreat; the second stage is the period of enemy's strategic consolidation and China's preparations for counter offensive; the third; and the final phase is when the Chinese troops launch offensive operations against the enemy forces, and force them to retreat. See Mao Zedong, *Six Essays on Military Affairs*, p.237.

**The “strategic transformation” of 1985 marked a drastic shift in China’s threat perceptions: China now perceived that its future armed conflicts would be local border wars.**

was required to extend its strategic depth away from the core centres of its economic activity. As such, China’s maritime provinces had to be converted from being the defensive front line of the Mao era, to the strategic rear. Accordingly, this strategic depth was to be achieved by extending the defence forward into the China Seas and the Western Pacific. This concept of active defence envisioned the PLAN not only as a tactical force but also a strategic force, and the spearhead of China’s national defence.<sup>38</sup>

**Although, the notion of extended strategic depth is not equivalent to the Western concept of forward defence, it does emphasise multi-layered defence lines or zones that can be extended beyond China’s territorial and maritime borders when the situation warrants.**<sup>39</sup>As operations conducted under such a strategy would largely entail an offensive posturing by the PLAN, it can be concluded that offence now became more pronounced within the strategy of active defence under modern conditions.

In spite of these developments, the Soviet Union remained China’s paramount security concern till the early 1980s. However, things begin to change by the mid-1980s, when Sino-Soviet rapprochement became increasingly possible. As a result of the new strategic environment, the “strategic transformation” of 1985<sup>40</sup> marked a drastic shift in China’s threat perceptions: China now perceived that its future armed conflicts would be local border wars and ruled out the possibility of an “early, total and nuclear” war.<sup>41</sup> As such, China was now required to conceptualise a new strategic outlook in consonance with its changed security environment

The defence modernisation programme launched under “strategic transformation” further recognised the need to turn away from Lin Biao’s

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38. Huang, n. 15. pp. 7-32.

39. Ibid.

40. The enlarged meeting of the CMC was held from May 23 to June 6, 1985.

41. Interestingly, the enlarged meeting of the CMC in 1985 had taken place just three months after Mikhail Gorbachev became the General Secretary of the Soviet Union, and expressed the desire to normalise Sino-Soviet relations.

“politics in command,” and modernise China’s defence forces along the lines of expertise, science and technology.<sup>42</sup>

Following from the above determinants of China’s strategic environment, **four major factors appear to be influencing its overall military strategy: evolution of the defence concept of extended strategic depth to account for a war under “modern conditions”; the new military doctrine of “local border wars”; justification for offensive operations under the strategy of active defence under modern conditions; recognition for technology and expertise over “redness.”** Further, ensuring economic development was now an integral aspect of China’s national security strategy. The PLAN’s strategy, during the 1980s was conceived within the dynamics of this strategic construct.

#### **OFFSHORE ACTIVE DEFENCE: EMERGENCE OF BLUE WATER STRATEGY**

Along with these developments, one development that greatly influenced the evolution of China’s naval strategy was the rise of Adm Liu Huaqing as the Commander-in-Chief (C-in-C) of the PLAN in 1982<sup>43</sup>. Soon after assuming the office of China’s Navy Commander, Liu wrote a paper claiming that the development of capitalism was closely related to three factors: prosperity in navigation, opening up of new sea routes, and discovery of new continents. According to Liu, the centre of world civilisation shifted from the Orient to Western Europe, and then to the United States. **But the new “Pacific Century” would soon arrive, and the Orient would again become the centre of world civilisation. This was perceived as a historical opportunity for China, and the Chinese Navy was required to shoulder this historical task**

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42. This is exemplified by the fact that under strategic transformation, it was decided to cut the size of PLA personnel by one million. To gradually downsize the army and reorganise the military along the lines of expertise still finds mention in Chinese military strategic thinking. For details, refer to White Papers on National Defense, published by the Information Office of the PRC, Beijing, China.

43. Admiral Liu Huaqing, a Long March veteran, had served in the 2<sup>nd</sup> Field Army under the command of Liu Bocheng and Deng Xiaoping in 1945. He was transferred to the PLAN in 1950 and was sent to the Soviet Union to study at the Voroshilov General Staff Academy from 1954 to 1958. Liu served as the Commander-in-Chief of the PLAN from 1982 to 1987, and was later promoted as the Vice Chairman of the Central Military Commission.

**The new strategy of 'offshore active defence' laid the ground for the PLAN's move towards creating a sphere of influence stretching up to the Northern Pacific.**

**by becoming an important force in the Pacific area to ensure successful modernisation of the country.<sup>44</sup>**

In consonance with this nationalistic mission, Liu laid out a plan for the Chinese Navy's operational reach, now referred to as the strategy of "offshore active defense."<sup>45</sup> In many ways, this strategy ascribes geographic parameters to the notion of 'extended strategic depth' in accordance with China's ever-growing national interests.

As per Adm Liu, "China's Navy should exert *effective control* of the seas within the first island chain."<sup>46</sup> Further, he described 'offshore' as a concept that is relative to the "high seas", and, therefore, the PLAN should be able to establish its strategic reach in the sea waters within the second island chain.<sup>47</sup> Hence, it can be established that if the doctrine of 'people's war under modern conditions,' led to the reconceptualisation of China's strategic frontiers, the new strategy of 'offshore active defence' laid the ground for the PLAN's move towards creating a sphere of influence stretching up to the northern Pacific.

For operational bounds, the first island chain comprises the Aleutians, Kurils, Japanese archipelago, Ryukyus, Taiwan, Philippine archipelago, and Greater Sunda Islands. The second island chain further includes the Bonins, Marianas, Guam, and Palau group<sup>48</sup>. As can be noted, the island chain concept is very much in consonance with China's perceived core national interests<sup>49</sup>: securing reunification of Taiwan with the PRC, and establishing China's sovereignty over the disputed waters/water bodies. **Hence, the**

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44. As cited in JPRS-CAR-90-052, July 16, 1990.

45. 'Offshore defence' is recognised as the official doctrine of the PLAN; See *China's National Defense in 2008*.

46. Huang, n. 15, pp. 7-32.

47. n. 44.

48. The islands specified as part of the second island chain are an assessment of the concept by Huang, n. 15, pp. 7-32.

49. For a discussion on China's national defence objectives, see *China's National Defense in 2010*, published by the Information Office of the State Council, People's Republic of China, March 2011, Beijing.

**strategy of offshore active defence now established a direct relationship between China's national goals and its naval strategy, thereby according PLAN a position of primacy within China's overall military strategy. Furthermore, under the strategy, the PLAN becomes an instrument of Chinese foreign policy.** However, it must be noted that the island chain concept is not regarded as the official strategy of the PLAN or any other organisation of the Government of the PRC.

Though several writings tend to restrict the island chain concept to a three-phase plan<sup>50</sup>, thereby rendering a strict sequential order to China's naval development, it seems that **Liu's idea was, in fact, a very fluid concept, wherein China's naval strategy was to evolve according to its domestic and international circumstances**<sup>51</sup>. Therefore, the concept leaves space for China to establish a conjunction between the security scenarios that it expects to face and the capabilities that it needs to develop in order to deal with them. The ultimate aim being PLAN's evolution into a blue-water navy.

The "offshore defence" parameter has been further quantified in two different ways: The official *Military Terms of the PLA* defines "offshore" as the sea area from the Chinese coastline to an outward stretch of 200 nautical miles.<sup>52</sup> Li Qianyuan defines "offshore" as the sea area of the "Exclusive Economic Zone (EEZ), and the continental shelf," which extends between 12 and 350 nautical miles from the coast. Li argues that China's actual frontline is not the coastline of the Mainland or the 12 nautical mile territorial waters, but the 200 nautical mile EEZ, and the 350 nautical mile perimeter of the

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50. As per this school of thought, China's blue water strategy is a three phased construct: during the first phase, the PLAN should be able to develop sea denial capability within the first island chain by 2000; during the second phase, the navy should be able to exercise maritime influence beyond the second island chain by 2020; and finally, during the third phase, the PLAN should become a naval power capable of making its presence felt globally by 2050. For details, see, You Ji, "The Evolution of China's Maritime Combat Doctrines and Models: 1949-2001," No.22, Working Paper Series, Institute of Defense and Strategic Studies, Singapore, May 2002.

51. For a discussion on the topic, see James R. Holmes and Toshi Yoshihara, *China's Naval Strategy in the 21<sup>st</sup> Century* (Abingdon, Routledge 2008), Ch.3, pp.27-47.

52. *Military Science Academy, Military Terms of the PLA* (The PLA Warrior Publishers, 1982), pp. 430. In this volume, the sea area from 200 nm to 600 nm from the Chinese coastline is defined as the "mid-distance sea," and the open ocean beyond 600 nm is defined as the "far-distance sea." Cited here from Huang, n. 15, pp. 7-32.

**Achieving air superiority would be an essential component of the military operations launched under 'offshore active defence.'**

continental shelf.<sup>53</sup>

By analysing the above mentioned definitions of the "offshore" concept, it can be concluded that in operational terms, the PLAN's strategy in the 1980s was focussed upon establishing sea-control in sea areas stretching up to the Northern Pacific. Therefore, it can be concluded that the 'offshore defence strategy,' was largely a nationalistic project aimed at projecting Chinese sea power in the international waters<sup>54</sup> and to establish China's control over the disputed waters around its periphery. In order to sustain this kind of forward projection, the PLAN would need to develop offensive capabilities of long-range precision strikes, long-range air attacks and the ability to launch preemptive strikes. Further, achieving air superiority would be an essential component of the military operations launched under 'offshore active defence.' Hence, it can be deduced that couched in the notion of 'defence,' the 'offshore defence' concept was oriented towards offence. This explains Liu's ambition to acquire an aircraft carrier for the PLAN.

However, as the strategy does not consider extending the PLAN's reach towards the Indian Ocean or the Southern Pacific, it can be deduced that securing China's SLOCs passing through the Indian Ocean was not a concern within Liu's strategy. One reason for this could be that throughout the 1970s and 1980s, the PRC was, in fact, a net exporter of oil,<sup>55</sup> and, hence, safeguarding China's shipping routes to the Middle East did not feature as a strategic concern in the Chinese national security thinking.

53. Li Qianyuan, "Strategy for the Defense of Exclusive Zone and Continental Shelf: Thinking on National Defense Development Strategy," no.8, 1988, pp.7-9. It is noteworthy that Li, an army General, was the commander of the 1st Group Army in the Nanjing MR when his article was published. Cited here from Huang, *Ibid.*, pp. 7-32.

54. As per the United Nations Convention on the Law of the Sea III, sea area beyond the EEZ of a country is recognised as international waters. For details, see [http://en.wikipedia.org/wiki/United\\_Nations\\_Convention\\_on\\_the\\_Law\\_of\\_the\\_Sea#UNCLOS\\_III](http://en.wikipedia.org/wiki/United_Nations_Convention_on_the_Law_of_the_Sea#UNCLOS_III)

55. Gal Luftt, "Fueling the Dragon: China's Race into the Oil Market," *Institute for the Analysis of Global Security*, available at <http://www.iags.org/china.htm>

### **NAVAL DIPLOMACY: EXTENDED DIMENSIONS OF PLAN'S STRATEGY**

Another dimension of naval strategy that is worth mentioning here is naval diplomacy. Post 1985, as China's national security strategy shifted to dealing with local and limited wars, it was recognised that such wars could be deterred or contained by conducting active diplomacy. Thus, the concept of

naval diplomacy emerged in the PLAN's strategic thinking. The Chinese specify two ways for conducting naval diplomacy: **static and dynamic**.

The static approach refers to altering the deployment of the maritime military force, or developing such force and facilities that express China's political and diplomatic intentions. This approach serves to "promote mutual understanding, and to propagate China's independent foreign policy and the accomplishments of construction and reform."<sup>56</sup>

The dynamic approach, on the other hand, refers to such acts of the maritime force that directly or indirectly express China's diplomatic and policy intentions. Such actions may "include fleet cruise and patrol exercises, either to show strength or to demonstrate sovereign jurisdiction over disputed areas." The dynamic approach might also involve ship visits to foreign countries and naval participation in scientific exploration and surveys. This approach, to a certain degree, intends to showcase China's resolve "to protect its national interests as codified by the international law."<sup>57</sup> **Following from these two strands, it can be deduced that symbolism is an integral aspect of China's naval diplomacy.**

**It is interesting to note the similarities between the Zen He voyages conducted from 1405 to 1453 AD and the static approach of contemporary naval diplomacy. Analysed from the perspective of naval diplomacy, the PLAN's repeated patrolling in the South China Sea, China's anti-piracy**

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56. Tan See Sang, "Human Security: Discourse, Statecraft, Emancipation", as cited in "Reconceptualizing the PLA Navy in Post-Mao China: Functions, Warfare, Arms, and Organization," Working Paper Series, Paper No. 30, Institute of Defense and Strategic Studies, August 2002, Singapore.

57. Ibid.

mission in the Gulf of Aden, the exploratory activities being conducted in the Pacific and Indian Oceans, and the recent sea trials conducted by the country's first aircraft carrier, all appear to entail a major component of symbolism of the dynamic kind.

### LOCATING PLAN WITHIN THE CONTEXT OF CURRENT STRATEGIC THINKING

Since the early 1990s, two factors have dominated China's national security concerns: Taiwan's move towards declaring independence, and the vulnerability of China's oil supplies coming from the Middle East. **The strategy that evolves from these security concerns manifests itself in the form of a three-dimensional structure of growth, energy shortage, and capabilities development.** The PLAN'S operational area for this strategic construct revolves around two different water bodies: the Indian Ocean, and the South China Sea, and thereby the Western Pacific.

*China's Naval Strategy for the Indian Ocean: Primacy of Economic Security*  
Maintaining high economic growth is integral to the Chinese notion of "Comprehensive National Power (CNP)."<sup>58</sup> As economic progress is crucial for maintaining social progress and the stability of the Communist regime, ensuring energy security assumes a position of primacy in the Chinese strategic thinking. **Therefore, the ability to use national forces to achieve political and economic goals when the times warrant is central to Chinese strategic thinking in the 21<sup>st</sup> century.**

Though coal still remains the mainstay of Chinese energy needs, the share of oil in the country's energy mix currently stands at 25 per cent, and is expected to rise to 30 percent by 2030.<sup>59</sup> Therefore, oil will continue to be China's second most important fuel in the years to come. As the bulk

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58. CNP is described as the "the sum total of the powers or strengths of a country in economy, military affairs, science & technology, education and resources and its influence," China Institute of Contemporary International Relations, 2000.

59. Hu Angang and Men Honghua, "The Rising of Modern China: Comprehensive National Power and Grand Strategy." Paper available at <http://www.irchina.org/en/pdf/hag.pdf>  
Phar Kim Beng and Vic Y.W Li, "China's Energy Dependence on the Middle East: Boon or Bane for Asian Security."

of Chinese oil consumption, about 70 percent, is sourced from the Middle East<sup>60</sup>, it becomes crucial for China to ensure the security of its energy supplies.

The Chinese oil ships from the Middle East travel through the Indian Ocean—right from the Persian Gulf to the Malacca Strait. Thereon, they enter the South China Sea, and finally reach the eastern coast of the country. The Chinese fear psychosis is rooted in the strategic thinking that in the wake of a Taiwan contingency, the US Navy would conduct a naval blockade of China's SLOCs with the Middle East, thereby paralysing the Chinese economy.

For this blockade to be operational, the Chinese identify two potential choke points on account of their narrowness, and, hence, limited depth of defence: the Strait of Hormuz and the Strait of Malacca. Further, the Strait of Hormuz falls within the range of direct strikes by the littoral states. Therefore, any political instability in the Middle East renders the oil shipping passing through this strait extremely vulnerable. **This security dilemma gets further reinforced due to the US Navy's continued presence in the Asia Pacific and the Indian Ocean**, and America's security commitments to Japan, South Korea and Taiwan.

The "Malacca Dilemma"<sup>61</sup>, in many ways forms the crux of China's naval strategy for the Indian Ocean Region. In order to bypass the Malacca Strait, and thereby avoid any interdiction of its ships by the US Navy during times of war, China is investing huge reserves of money in laying

**As the bulk of Chinese oil consumption, about 70 percent, is sourced from the Middle East, it becomes crucial for China to ensure the security of its energy supplies.**

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60. Beng and Li, *Ibid.*

61. In an enlarged annual conference of the CMC in December 2003, President Hu Jintao declared that "certain major powers" were bent on controlling the strait, and called for the adoption of new strategies to mitigate the perceived vulnerability. Thereafter, the Chinese press widely referred to the issue as China's "Malacca Dilemma". For details, See Ian Storey, "China's Malacca Dilemma," *China Brief*, The Jamestown Foundation, 2006.

**China is rapidly increasing its influence and presence in the Indian Ocean Region by the way of joint naval exercises, UN peace-keeping missions, and arms sales.**

oil pipelines through the Indian Ocean littorals.<sup>62</sup> Along with this, China is also constructing port facilities along several Indian Ocean states. Though these ports are described by the PRC as representing purely commercial interests, military analyst often see these facilities as China's attempt to secure permanent naval bases in the Indian Ocean Region. Described under the strategy of the "String of Pearls,"<sup>63</sup> these infrastructural developments are regarded as aimed towards India's strategic encirclement—

the only Indian Ocean state capable of competing with the Chinese Navy. Here it must be mentioned that the "String of Pearls" is entirely contingent upon the Indian Ocean states taking the side of China in the event of an Indo-Sino War. Therefore, **a counter strategy for India to deal with the Chinese threat lies very much in the diplomatic and foreign policy domain. Along with enhancing its naval capabilities, India needs to foster its ties with the Indian Ocean littorals through economic, military, and cultural measures.**

In addition to this, **China is rapidly increasing its influence and presence in the Indian Ocean Region by the way of joint naval exercises, UN peace-keeping missions, and arms sales.** In November 2003, China conducted a joint naval exercise with Pakistan off Shanghai. This was China's first ever joint exercise with any country. In 2005, China conducted its first ever joint exercise outside Chinese waters, again with Pakistan. This naval exercise was conducted off Karachi.

62. Some of the pipelines that are being constructed or have been proposed by China along the Indian Ocean states are : a pipeline from Gwadar in Pakistan to Xinjiang, a 1,200-km oil pipeline from Sittwe/Kyaukphe in Myanmar/Bangladesh to Kunming/Rili in China's Yuan province. Another pipeline is being laid across the Malay Peninsula in Malaysia from Yan (Andaman Sea) to Bachok (South China Sea). For details, see Gurpreet Khurana, "China's 'String of Pearls' in the Indian Ocean and Its Security Implications," *Strategic Analysis*, IDSA, 2009.

63. "The String of Pearls" describes the manifestation of China's rising geo-political influence through efforts to increase access to ports and airfields, develop special diplomatic relationships, and modernise military forces that extend from the South China Sea through the Strait of Malacca, across the Indian Ocean and on to the Arabian. See Christopher J. Pehrson, "String of Pearls: Meeting the Challenge of China's Rising Power Across the Asian Littoral," *Strategic Studies Institute*, 2006.

Further, several Indian Ocean states are becoming the recipients of Chinese arms sales.<sup>64</sup> Since the 1960s, Chinese-made arms have been finding their way into Africa and Pakistan. Bangladesh and Sri Lanka have been procuring Chinese arms and weapons since the early 1970s. Since the Indian military's withdrawal from Sri Lanka in 1990, Beijing has supplied Colombo with as many as 10 naval ships. In December 2002, Beijing entered into an agreement to meet Dhaka's defence requirements—the first signed by Bangladesh with any country. Myanmar has been heavily dependent on China for its military supplies since 1988. In 2005, Beijing signed a memorandum of understanding on defence cooperation with Malaysia and Indonesia. **Apart from generating revenue, these defence exports help in fostering political ties, and cultivating dependence.**

Along with this, participation in anti-piracy missions in the Gulf of Aden, and conducting exploratory activities in the Indian Ocean not only provide the PLAN familiarity with the terrain, but also enable it to pursue deep ocean combat training.<sup>65</sup>

Though there is no formal policy paper issued by the PRC with respect to the Indian Ocean, it can be concluded from the above discussion that China's Indian Ocean strategy revolves around enabling the PLAN to acquire strategic reach within the oceanic waters. The modus operandi to

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64. For a detailed discussion on the issue, see Khurana, n. 62, Refer to Appendix C.

65. The strategic implications of the PLAN's Somalia mission are best explained by You Ji and Lim Chee Kia, "China's mounting dependence on sea-borne trade requires the PLAN to add a new focus to Liu Huaqing's strategy. Now the PLAN has to position itself as a regional navy but with beyond-region power projection capabilities that can be deployed in any area where China's economic security is under threat. The deployment to the Gulf of Aden testifies how this strategic adjustment has been implemented.....PLAN's Somalia task group provides the basic form upon which its future expedition fleets will be organized. Using its first deployment as an example, Destroyer 169 (7,000 tons), the flag ship for the South Sea Fleet with the navy's best C4ISR systems, specializes in sea control missions such as anti-submarine warfare. Destroyer 171 (7,500 tons) is one of the only two naval surface combatants that has the Chinese *Aegis* systems capable of area air defense. Refurbishing ship 887 is the PLA's largest and newest logistical vessel (22,000 tons) designed for long range logistical missions. These ships form the core components of an ocean-going flotilla. *If they are joined by a few more specialized warships, such as ASW and air defense frigates and a few submarines, a standard maritime battle group would be in order* (emphasis added)..... **Beyond doubt, China's deployment signals the beginning of its gunboat diplomacy and as one of the busiest sea lanes in the world, the Straits of Malacca will be one of the targets of China's gunboat diplomacy.....**"(emphasis added). See You Ji and Lim Chee Kia, "Implications of China's Naval Deployments to Somalia," *East Asian Policy*, pp.61-68.

accomplish this objective appears to be the diplomatic and bilateral channels being established by the PRC with the Indian Ocean littorals. Analysed from a military-strategic perspective, there is a strong possibility of these channels being used by the PLAN to establish a permanent presence in the Indian Ocean in the future.

*South China Sea: Dynamic Interplay Between the Forces of Nationalism and Agenda for Economic Security*

**It is in the context of economics that the PRC's "One China Policy" assumes a geo-strategic dimension.** Apart from being an issue rooted in the notion of nationalism, sovereignty over Taiwan would provide the PLAN with sufficient strategic depth to establish sea control within the South China Sea, and thereby uphold its claims over the Spratly and Paracel Islands.

The importance of these two island chains in China's strategic thinking can be gauged from the fact that as early as June 1980, the Chinese Ministry of Foreign Affairs had issued a document entitled "*China's Sovereignty Over the Xisha and Nansha Archipelagoes is Indisputable.*" The document argued that these two islands have been Chinese territories since the ancient times.<sup>66</sup> Further, another article, published in 1988, argued, "The strategically and economically important Nansha Islands and surrounding waters have a bearing on the basic interests of the Chinese nation. We should adopt a modern concept of the 'strategic ocean' in forming our perspective on these islands."<sup>67</sup>

Maintaining control over the South China Sea is crucial to the Chinese economic interests. The South China Sea provides sea lanes of communication that connect Northeast Asia with Southeast Asia and the Middle East via the Indian Ocean. As the Spratly Islands lie between Vietnam and the Philippines, any naval or air capabilities based on this archipelago would have the range to block ships passing through the Malacca and Sunda

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66. JPRS-CAR-90-052.

67. Shen Changjing, "What We Have learnt from the Spratly Island," *Jianchuan Zhishi*, February 1998. Cited here from JPRS-CAR-88-034, June 1988, pp.12-14.

Straits<sup>68</sup>—the two vital choke points for the shipping passing through the South China Sea.

Further, as China's centre of gravity for economic development lies in the southeastern regions, any armed conflict in the region would leave its commercial centres such as Shanghai, Guangzhou and Shenzhen extremely vulnerable to enemy attacks. Therefore, in order to guarantee the border security of its commercial centres, it is important that China extends its defence depth towards the sea, and, hence, the primacy of Taiwanese reunification in the Chinese strategic thinking.

Moreover, as the SLOCs in the South China Sea are used by the US Navy and Air Force to traverse between its bases in the Pacific and the Persian Gulf, control over this strategic water body, and the adjacent waters of the East China Sea, and the Yellow Sea would enable the PLAN to project its power within the second island chain. **This strategy is very much in consonance with Liu's island chains concept.**<sup>69</sup>

Though China and the 10 ASEAN (Association of Southeast Asian Nations) countries signed the Declaration on the Conduct of Parties in the South China Sea in 2002, not much progress has been made towards resolving the disputes. Recent Chinese objections to the Indo-Vietnamese oil drilling operations in the South China Sea further serve as an example of China's assertiveness regarding its claims over this disputed water body. As none of the littoral states is ready to compromise on its existing position on the South China Sea issue, it can be concluded that any resolution to this conflict would largely be achieved through the employment of force.

Following from this, it can be concluded that the PLAN's strategy for the Asia-Pacific region is geared towards establishing the PLAN as a regional blue water navy. This type of navy, while executing sea control within its own region, also possesses the capability to project power beyond its own

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68. Jayadeva Ranade, "The Implications of China's Navy Modernisation," *Air Power Journal*, vol. 4, no.4, Winter 2009, pp. 1-16.

69. The importance of the South China Sea in Chinese strategic thinking is further exemplified by the fact that most of the recent maritime issues between the US and China have taken place in these waters, including the 2001 EP-3 incident, the 2009 USNS *Impeccable* incident and China's 2010 protests over the participation of *George Washington* CSG in military exercises in the Yellow Sea.

**The fulcrum of this new military doctrine is the RMA with Chinese characteristics, whereby China aims to undertake simultaneous advancement in mechanisation and informationisation.**

region and compete effectively for sea control and impose sea denial in distant waters.<sup>70</sup>

**EMERGING CONCEPTS OF WARFARE:**

It was in the 1990s that the Chinese military doctrine assumed the new dimensions of 'high technology', and information warfare. The trigger for this doctrinal change was initiated by two simultaneous factors: end of the Cold War and collapse of the Soviet Union in 1991, and the first Gulf War.

Disintegration of the Soviet Union, and consequent foundation of a unipolar world order led by the United States of America, provided the Chinese with the strategic rationale to develop a more capable military.

The Gulf War of 1991 provided China with the blueprint for its future military modernisation programme. The Gulf War introduced China to the modern warfare concepts of: the importance of electronic warfare, joint operations as the crucial element of warfare operations, importance of integrated command and control, importance of early warning, and advanced communication relay stations to the modern battlefield. Further, China learned about the new advances in high-tech weaponry that allowed the forces to conduct long-range operations and precision-guided munitions. In accordance with this new orientation of modern warfare towards high-technology weaponry, China's military doctrine subsequently graduated to

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70. The PLAN planners divide the world's navies into three categories: the far-oceans offensive types (or global blue-water type), regional defensive and offensive type (or regional blue-water type), and coastal defensive type. The US Navy belongs to the first category, while the Indian Navy is alleged to be "sub-regional." The medium term (around 2020) goal of the PLAN is to become a regional blue-water navy. This type of navy can operate effectively for control of the seas within its own region. In the meantime, it also possesses the capability to project power beyond its own region and compete effectively for sea-control and impose sea-denial in the seas of the other oceans. As cited in Nan Li, "The Evolution of China's Naval Strategy and Capabilities: From the "Near Coast" and the "Near Seas to " Far Seas," *Asian Security*, vol.5, no.2, 2009, pp.144-169. .

**“limited wars under high-technology”** conditions.<sup>71,72</sup>

While China was assimilating the concepts of high-technology warfare, the US military discourse started focussing upon a new “Revolution in Military Affairs (RMA).” This new RMA was centralised on the idea of intelligence and information as the basic and most crucial elements of future warfare scenarios. Consequently, the Chinese military doctrine evolved to **“limited wars under informationized conditions.”** The fulcrum of this new military doctrine is the RMA with Chinese characteristics, whereby China aims to undertake simultaneous advancement in mechanisation and informationisation,<sup>73</sup> thus, accounting for China’s relative lack in high-tech equipment, and information-warfare capabilities. The doctrine further aims to build informationised armed forces, capable of winning informationised wars by the mid-21<sup>st</sup> century.<sup>74</sup> In spite of this centricism with informationisation, the Defence White Papers do not spell out China’s information warfare doctrine. **Hence, it is difficult to ascertain the impact of informationisation on the PLAN’s strategy per se.**

In spite of this, the primacy of information-centric warfare is gaining a strong hold in the navy’s strategic discourse. This is exemplified through the following views expressed by the military analysts at the Navy Research Institute, Beijing:

...information deterrence is a new concept of victory without fighting wars....  
The side controlling information will be able to manipulate the beginning, middle, and end of the war, attack the enemy with advanced information

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71. For a detailed discussion on China’s doctrinal evolution, see, David Shambaugh, *Modernizing China’s Military: Progress, Problems, and Prospects*, (University of California Press), Ch. 3, pp. 56-107, 2004.

72. On January 13, 1993, President Jiang Zemin delivered a speech to an expanded meeting of the CMC in which he promulgated a new military strategy for the PLA to guide its future modernisation efforts. During the meeting he pointed out, “We had shifted our strategic guideline from aiming at engaging in an early war, an all-out war and a nuclear war to a local war under the condition of modern technologies, especially high technologies. This shift represents the development and improvement of our strategic guideline.” For details, see Wu Jun Sun Xiangli Hu Side, “The Impact of Revolution in Military Affairs on China’s Defense Policy,” Institute of Applied Physics and Computational Mathematics, Beijing, China.

73. *China’s National Defense in 2004*, published by the Information Office of the State Council of the People’s Republic of China, Beijing, December 2004.

74. *China’s National Defense in 2006*, published by the Information Office of the State Council of the People’s Republic of China, Beijing, December 2006.

weapons to paralyse enemy aircraft, vessels and various command systems, and destroy important targets with precise firepower.<sup>75</sup>

Though this doctrinal evolution did not mark any shift in the navy's strategic objectives, the emphasis upon modern technology, along with China's economic progress that enabled it to afford such technology, has transformed the capabilities structure of the PLAN.

In order to achieve its strategic objectives of reunification of Taiwan with the Chinese Mainland, and further its projection in the Western Pacific, the PLAN would need to develop two sets of capabilities. For the Taiwan contingency, the navy would have to focus its attention upon establishing local sea control for sea crossing and amphibious-landing operations. In order to achieve this objective, the PLAN would be required to perform the two-pronged missions of crushing or paralyzing the Republic of China's (ROC's) counter-attacks to China's sea control operations, and simultaneously deny the US forces an entry into the theatre of operation. During the conflict, the American forces might also try to impose a no-fly zone over Taiwan, thereby further rendering it difficult for the PLAN to conduct its operations. As such, a war on Taiwan would be fought under a joint operations construct, largely composed of the navy and the air force. In order to conduct successful area-denial operations against the US forces, the PLAN would need to integrate its land-based aircraft, submarine force, and cruise missiles with its ballistic missile force. This thinking has begun to find resonance in Chinese strategic thinking as all the Defence White Papers, post 2000, lay an increased emphasis upon developing the joint warfare capabilities of the navy, air force and second artillery.<sup>76</sup> Further, the 2006 Defence White Paper clearly lays out that the navy, "...aims at gradual extension of the strategic depth for offshore defensive operations and enhancing its capabilities in integrated maritime operations and nuclear counterattacks."

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75. Naval Captain Shen Zhongchang , Naval Lieutenant Zhou Xinsheng and Naval Lieutenant Commander Zhang Haiying, Navy Research Institute, Beijing, " The Military Revolution in Naval Warfare", *China Military Science*, 1996. Cited here from Michael Pillsbury, *Chinese View of Future Warfare* (Institute of National Strategic Studies).

76. *China's National Defense in 2010*, published by the Information Office of the State Council of the People's Republic of China, Beijing, March 2011.

To sustain projection in the Western Pacific, China would again need to rely upon developing its joint warfare capabilities, and, hence, the need for an integrated command and control. Further, this kind of projection is possible only with the help of long-range precision guided weaponry, and strong naval aviation. China's first aircraft carrier, the *Varyag*, can be regarded as a move in this direction.

Therefore, it can be concluded that the PLAN's strategy since the 1990s encompasses and articulates China's growing national interests, which now stretch from the Indian Ocean to the Pacific Ocean. These growing national interests further are the constructs of a dynamic interplay among the factors of economics, nationalism, and geo-strategy.

#### **CAPABILITIES DEVELOPMENT**

Though the strategy of offshore active defence was laid down in the early 1980s, severe lack in capabilities impeded China's march towards the blue waters. This lacuna can be attributed to a host of domestic and international factors, namely: deficient economic resources to afford capital-intensive naval technologies and equipment, post-Tiananmen sanctions imposed upon China, near-absence of indigenous Research and Development (R&D), and the prevalent bias in the Central Military Commission (CMC) towards the land forces over the naval or air forces.

It was by late the 1990s that China embarked on a more serious plan to modernise its naval forces. Post 2000, there has been substantial progress in China's naval development programme. The genesis of this development can be located in the rapid economic growth witnessed by the PRC since the 1990s, which not only enabled China to invest in naval hardware and technology, but also established the 'seas' as the focal point of its security-strategic thinking. Also, by the late 1990s, the PLA had completed three rounds of downsizing since 1985. As a consequence, more funds were now available for developing a technology-intensive Service such as the navy.

In consonance with the strategy of offshore active defence within the doctrine of "limited wars under informationized conditions," China is

**China's MaRVed missiles with conventional warheads would have the ability to degrade vital US defence capabilities, including the Aegis air and missile defence systems and carrier flight decks.**

developing capabilities for offensive operations. The most potent manifestation of this strategy is exhibited through the emerging joint warfare construct between the navy and the second artillery. In consonance with this construct, China is developing a set of ballistic missile capabilities that include Medium Range Ballistic Missiles (MRBMs) (the DF-21C) and Short-Range Ballistic Missiles (SRBMs) (the DF-15 and 11). Along with conventional warheads, these missiles are expected to play a crucial role in a war with Taiwan. This kind of strategic capability holds the potential of neutralising the air and missile defences of Taiwan, and simultaneously inflicting heavy damage on the Taiwanese naval forces before they can leave the ports, thus, severely jeopardising Taiwan's retaliatory capability.

The PLAN's enhanced capabilities in terms of strategic missile submarines (Jin class-Type 094, and Xia class-Type 092 SSBNs), and attack submarines (Shang class-Type 093, and Han class-Type 091/091G SSNs) further complement the nuclear-oriented force structure. Moreover, the Jin class SSBNs are armed with 12 strategic ballistic missiles with a range over 7,200 km. These missiles are believed to be equipped with Manoeuvring Advanced Reentry Vehicles (MaRVs). Such capability orientation enables the PLAN to confuse and, thereby, delay or deter, enemy naval operations. According to some analysts, China's MaRVed missiles with conventional warheads would have the ability to degrade vital US defence capabilities, including the Aegis air and missile defence systems and carrier flight decks.

Further, the Jin and the Shang class submarines also serve to project the PLAN in the distant waters. Not only are these submarines capable of nuclear deterrence, they are also sufficiently large enough to sustain operations in far and deep oceans, and carry a variety of weapon systems such as Anti-Submarine Warfare (ASW) missiles, Anti-Ship Cruise Missiles (ASCMs) and Land-Attack Cruise Missiles (LACMs).

In addition to these, the PLAN also has a fleet of non-nuclear submarines: the Kilos, the Yuans, the Songs, along with the older Mings and the remaining Romeos. The Kilo-class and Song-class submarines represent a major component of China's ASCM capabilities. Each of the 12 Kilos and 13 Songs is equipped with the SS-N-27B ASCM, and YJ-82 ASCM respectively. The Kilos are capable of launching missiles while submerged at a distance of about 300 km. Hence, these boats constitute a potent force to conduct area denial missions in nearby waters. Moreover, the numerical advantage offered by the PLAN's submarine force can be used to complicate the ASW picture for the opponent forces.

The PLAN's operational capability is further enhanced by its fleet of modern surface combatants. This fleet structure is led by the Russian origin Sovremenny DDGs. These ships are equipped with subsonic ASCMs with ranges of 160 km (Type 956E) and 240 km (Type 956EM). To overcome their subsonic speed, and thereby reduce their vulnerability to air attacks, these DDGs possess area air-defence capabilities. The Surface-to-Air Missiles (SAMs) on the Sovremennys have ranges between 25 km (Type 956E), and 45 km (Type 956 EM). Further, the Luyang-class of destroyers carry subsonic ASCMs with ranges of 150 km (Luyang I), and 280 km (Luyang II). The Luyang II DDGs are equipped with the Vertical Launching System (VLS) based SAMs with a range of 90 km. The Luzhou-class DDGs too are equipped with ASCMs with a range of 150 km. The SAMs on these ships are also VLS-based, with a range of 80 km.

A critical component of the PLAN's capabilities is emerging in the form of the PLA naval air force. The most potent components of this force structure are the Russian origin Su-30MK2 aircraft, the indigenous B-6s (also equipped with ASMs) and FB-7 maritime interdiction aircraft.

In spite of these structural developments, in order to fight a war under informationised conditions, China would need to enhance its intelligence, surveillance, and reconnaissance capabilities.



# INDIA-IRAN RELATIONS: CHALLENGES AHEAD

K.N. TENNYSON

*If history, as distinct from archaeology, is the history of the human past from written sources, then India's history begins with the Aryans.*

— A.L. Basham

India and Iran have shared civilisational affinities, historical links and economic cooperation for centuries. However, their relations took a new turn after the partition of the Indian subcontinent into India and Pakistan. Following the partition, India lost its geographical contiguity with Iran and the two countries followed divergent foreign policies arising out of the post-partition political developments. The emergence of the Cold War politics in the region further complicated the two Asian countries' relations. However, despite following divergent foreign policies, India and Iran did not completely relinquish their diplomatic relations: on March 15, 1950, the two countries signed a Treaty of Friendship to strengthen their relations for mutual benefit and development. Iran helped India during the 1962 Indo-China War and India stood by Iran during the 444 days (November 4, 1979 to January 20, 1981) American hostage crisis and during the shooting down of an Iranian civilian jet airliner [Iran Air Flight 655 (IR655)] by the US Navy over the Strait of Hormuz ( July 1988). Yet, India-Iran relations

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never reached maturity, and Iran supported Pakistan during the 1965 and 1971 India-Pakistan Wars. Besides, Iran considered the problem of Kashmir to be a religious issue, and, supported Pakistan on the latter's claims on Kashmir on several occasions.

### **INDIA-IRAN RELATIONS AFTER THE END OF THE COLD WAR**

The withdrawal of the Soviet Union from Afghanistan and the subsequent end of the Cold War politics brought a ray of hope of peace returning to the region. However, India-Iran relations did not witness any significant change. Ever though India came out in support of Iran during the Iranian civilian jet airliner crisis, the Iranian leaders ignored Pakistan's nefarious actions to destabilise India and condemned the Indian government for inappropriate handling of the crisis in Kashmir. On January 24, 1990, the official spokesman of the Iranian Foreign Ministry, addressing a press conference in Tehran, expressed "profound regret" over the handling of riots in Kashmir and called deployment of the Indian armed forces in the riot stricken areas (Kashmir) "unjustified" while IRNA (Iranian News Agency), in an outrageous manner, wrote that "Kashmir is being reduced to fire and blood." Iran not only condemned India on the mishandling of the Kashmir issue but also expressed its displeasure by withdrawing the invitation to the Foreign Minister of India, I.K. Gujral who was to visit Iran in April 1990 to co-chair the meeting of the Indo-Iranian Joint Commission in Tehran.<sup>1</sup>

As Iran's Pakistan policy led to serious policy problems for India, Indian Prime Minister Narasimha Rao visited Iran in September 1993 to resolve the misunderstanding that had arisen between the two countries. Prime Minister Rao's visit to Tehran marked an important landmark in the history of the two countries' relations, because it not only helped in defusing the misconception and restoring the cool diplomatic relations that existed between the two countries, but was also the first visit to Iran by an Indian Prime Minister after the Iranian revolution. In the light of this development, Iran prevented India from being humiliated at the United

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1. Sheel K. Asopa, "India and West Asia in the New World Orders: Perspectives and Trend," in Arun Chaturvedi and Sanjay Lodha, eds., *India's Foreign Policy & The Emerging World Order* (Jaipur: Printwell Publishers, 1998), p. 212.

Nations Human Rights Commission (UNHRC) by pressuring Pakistan to refrain from presenting the resolution alleging violation of human rights by India in Kashmir in March 1994.<sup>2</sup> Iranian President Akbar Hashemi Rafsanjani returned Prime Minister Rao's visit to India in April 1995, which was followed by the visit of India's Vice President K. R. Narayanan to Iran in October 1996.

In the course of these developments, the Taliban,<sup>3</sup> a new radical Islamic students' militant group, which was unknown to the outside world, took advantage of the perturbed political condition in Afghanistan and came

to power in the mid-1990s. The establishment of the Taliban government in Afghanistan not only changed the political conditions in Afghanistan but also affected the relations of the countries of the region. Pakistan and Saudi Arabia, in collaboration with the US, supported the Taliban, while India, Iran, Tajikistan, Uzbekistan and Russia backed the anti-Taliban Northern Alliance. Iran did a somersault in its policy, from a close alliance with Pakistan to support to the anti-Taliban Mujahideen groups, because the Taliban were intolerant towards other religious minorities and ethnic groups. Besides, the Taliban, after consolidating their hold on Afghanistan's politics, began to impose an extreme interpretation of Islam (strict Islamic *Sharia* law), based upon the rural Pashtun tribal code, on the entire country and began to commit massive human rights violations on the Afghan ethnic and religious minorities living in the country.<sup>4</sup>

Taking into consideration the exigency of the changed political development in the region, India began to manoeuvre its foreign policy

**Strategic "security environment," according to the *Annual Report 2000-2001*, of India's Ministry of Defence "extends from the Persia Gulf in the east and from the Central Asian Republic in the north to the equator in the south.**

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2. Ibid., pp. 212-13.

3. In Pushto, the word "*Taliban*" generally denotes students studying in "*deeni madaris*" (religious institutions), see Kamal Matinuddin, *The Taliban Phenomenon: Afghanistan 1994-1997* (New Delhi: Lancer Publishers & Distributors 2000), p. 12.

4. Bureau of South and Central Asian Affairs, *Afghanistan*, at <http://www.state.gov/r/pa/ei/bgn/5380.htm>, accessed November 27, 2012.

towards its delineated strategic security interest. This strategic “security environment,” according to the *Annual Report 2000-2001*, of India’s Ministry of Defence “extends from the Persian Gulf in the east and from the Central Asian Republic in the north to the equator in the south.”<sup>5</sup> Consequently, in April 2001, India’s Prime Minister Atal Behari Vajpayee led a high level delegation team to Iran, the first visit by an Indian Prime Minister since 1993.<sup>6</sup> India-Iran relations were not confined to economic and political cooperation but extended to defence as well. In April 2001, the Defence Minister of India followed India’s Prime Minister Vajpayee’s visit to Tehran and discussed “issues of mutual concern” and signed a Memorandum of Understanding on defence cooperation with Iran. Three months later, in July 2001, a high level Iranian defence delegation led by Brig Gen Dr. Hussein Dehghan, Deputy Minister of Defence of Iran, visited India and the first meeting of the India-Iran Joint Working Group on Defence Cooperation took place.<sup>7</sup>

### **WAR ON TERROR: IMPACT ON INDIA-IRAN RELATIONS**

While the world community was entering the 21<sup>st</sup> century with renewed zeal, looking forward to a new century, a century of peace, progress and development, the mighty, impervious US was attacked by Osama bin Laden’s Al Qaeda terrorist group on September 11, 2001. The US policy-makers convincingly accused Osama bin Laden’s Al Qaeda group of masterminding the attack on America and demanded that the Taliban surrender Osama bin Laden to the US. With the Taliban having refusing to surrender Osama bin Laden, the US launched a military campaign, Operation Enduring Freedom (OEF) “against Al Qaeda terrorist training camps and military installations of the Taliban regime in Afghanistan” on October 7, 2001.<sup>8</sup> Consequently, the

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5. Government of India, Ministry of Defence, *Annual Report 2000-2001*, p. 2.

6. Press Information Bureau, Government of India, Joint Press Statement on the Prime Minister’s Visit to Iran, at <http://pib.nic.in/archieve/lreleeng/lyr2001/rapr2001/13042001/r130420013.html>, accessed June 14, 2011; Prime Minister Vajpayee’s delegation included Jaswant Singh, Minister of External Affairs and Defence, Omar Abdullah, Minister of State for Commerce and Industry, Brajesh Mishra, Principal Secretary to the Prime Minister and National Security Adviser, and other senior officials.

7. n.5, p. 138.

8. Text of the address of President George W. Bush made from the Treaty Room in the White House on October 7, 2001, at <http://www.september11news.com/October.htm>, accessed on March, 22, 2010.

Taliban, unable to withstand the onslaught of the US and its coalition partners' superior military forces, withdrew from Kabul in mid-November 2001.

As the US intensified the war against terrorism, the President of the US, George W. Bush, in his State of the Union Address on January 29, 2002, branded Iran, Iraq and North Korea as members of the "axis of evil" alleging that these countries were "seeking weapons of mass destruction, [therefore,] these regimes pose a grave and growing danger" to the peace of the world.<sup>9</sup> However, India did not

**India believes that peace and stability in "Afghanistan is critical to India's [economy and] security and Iran can provide a major stabilising influence [in Afghanistan]."**

share the US assessments that Iran was "arming to threaten the peace of the world," thus, despite the US campaigning with the world community to isolate Iran, India continued its relations with Iran. India believes that peace and stability in "Afghanistan is critical to India's [economy and] security and Iran can provide a major stabilising influence [in Afghanistan]."<sup>10</sup> At the same time, India also saw the geographical importance of Iran that could enable India to have overland transport facilities connecting Afghanistan and the energy rich Central Asian countries, something which Pakistan was not willing to comply with. The other obvious reason was that India "views Iran as an influential Islamic state that can effectively counter Pakistan's anti-India propaganda in the Islamic world."<sup>11</sup> On the other hand, Iran having being demonised by the US, was even more keen to develop close diplomatic relations with India, as that would enable Iran to come out of the "rogue" status imposed on it by the US and strengthen its position in the global politics. Besides, India, unlike Iran, did not have strained relations with the West, therefore, "India is seen by Iran as an important partner and a possible conduit to the West."<sup>12</sup>

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9. "Text of President Bush's 2002 State of the Union Address, January 29, 2002," at <http://www.washingtonpost.com/wp-srv/onpolitics/transcripts/sou012902.htm>, accessed June 3, 2011.

10. Dr. Monika Chansoria, "India-Iran Defence Cooperation," *Indian Defence Review*, vol. 25, no. 1, January-March, 2010, p. 132.

11. Harsh V. Pant, "India and the Middle East: A Re-Assessment of Priorities?" in Harsh V. Pant, ed., *Indian Foreign Policy in a Unipolar World* (New Delhi: Routledge, 2009), p. 254.

12. *Ibid.*

With this background, Dr. Hasan Roophani, Secretary to the Supreme National Security Council of Iran visited India in June 2002 and met various high level Indian leaders, including India's Prime Minister, Defence Minister and External Affairs Minister. Dr. Roophani discussed a range of bilateral issues which included economic cooperation, investments and trade; political issues and security matters, including energy security. On Afghanistan, the two countries "stressed the need for accelerating the rehabilitation and reconstruction process" in the war-wracked country.<sup>13</sup> Dr. Roophani's visit was followed by the visit of Mohammad Shariatmadari, Iranian Trade Minister, to India on January 5, 2003. There was also a report which indicated that in January 2003, Adm Madhavendra Singh, Chief of the Indian Navy and Chairman of the Chiefs of Staff Committee, visited Tehran and signed an agreement on defence cooperation with the Iranian Minister of Defence.<sup>14</sup>

India, having felt the need to further entrench its diplomatic relations with Iran, invited Iranian President Mohammad Khatami as the chief guest at the Independence Day celebration on January 26, 2003. Iranian President Khatami was invited to India despite the US clubbing Iran in the "axis of evil" group. During President Khatami's visit, a "New Delhi Declaration" was signed along with seven other substantive agreements which set forth the "vision of a strategic partnership" between the two countries. The New Delhi Declaration included various aspects of bilateral cooperation ranging from economic exchanges to defence cooperation, cooperation in the energy sector, science and technology, information technology, education and training, reconstruction of Afghanistan, and other global issues. On the issue of terrorism, India and Iran "reiterate their resolve to strengthen the international consensus and legal regimes against terrorism, including early finalisation of a Comprehensive Convention against International Terrorism... Iran and India agree to continue joint cooperation to address the issues of international terrorism

13. "India-Iran Joint Press Statement, New Delhi, June 28, 2002, *Strategic Digest*, vol. 32, no. 7, July 2002, pp. 957-58.

14. For a brief analysis of Adm Madhavendra Singh's visit to Tehran, see Rizwan Zeb, "The Emerging Indo-Iranian Strategic Alliance and Pakistan," December 2, 2003, at <http://cacianalyst.org/newsite/?q=node/902>, accessed December 22, 2009.

and trafficking in narcotic and psychotropic substances.”<sup>15</sup> Continuing their cordial diplomatic relations in March 2003, two Iranian warships, *Bandar Abbas*, a fleet replenishment tanker, and *Lavan*, a logistics support vessel landed in Mumbai on a five-day goodwill visit and participated in the first-ever India-Iran joint naval exercises off the Mumbai coast (Arabian Sea).<sup>16</sup> This event was followed by the visit of the Iranian Vice President, Isfandiar Rahim Mashae, and the Chief of Iranian Air Force to India, in March and May 2003 respectively.

Unfortunately, India-Iran relations came under stern scrutiny from the US. According to Christine Fair, a leading American strategic security analyst, the US’ “increased scrutiny of the Indo-Iranian relationship arose due to the temporal convergence of two unrelated developments: the ever-deepening Iranian nuclear crisis and the efforts of President George Bush to persuade the US Congress to adopt legislation enabling a civilian nuclear deal for India.”<sup>17</sup> Indian officials downplayed the Iranian leaders’ visits to New Delhi and the port call of Iranian warships, arguing that they were “insignificant and should not trouble the US.”<sup>18</sup> But, the US policy-makers were not convinced because the successive visits of Iranian leaders (the President, Vice President and Chief of the Air Force) to India undermined the efforts of the US and Western countries to isolate the Iranian regime. At the same time, the US policy-makers viewed the growing relations between India and Iran unfavourably, as “when the US was positioning itself to attack Iraq, resulting in turmoil in West Asia, [as ] India’s attempt to distance itself from the US foreign policy vis-à-vis West Asia.”<sup>19</sup>

In June 2005, India, keeping in view its national interest, ignored the US pressure to isolate Iran and sent an Indian delegation to Pakistan, and

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15. Full text of “The New Delhi Declaration,” January 25, 2003, at [http://www.satp.org/satporgtp/countries/india/document/papers/iran\\_delhidecl.htm](http://www.satp.org/satporgtp/countries/india/document/papers/iran_delhidecl.htm), accessed April 2, 2011.

16. Imtiaz A, “First Joint India-Iran Naval Exercise,” October 3, 2003, at <http://www.pakdef.info/forum/archive/index.php/t-3713.html>, accessed May 3, 2011. There were also reports of about 222 Iranian Navy personnel being trained in Cochin in India.

17. C. Christine Fair, “Indo-Iranian Ties: Thicker than Oil,” *Middle East Review of International Affairs*, vol. 11, no. 1, March 2007, at <http://meria.idc.ac.il/journal/2007/issue1/Fair.pdf>, accessed May 21, 2009.

18. The India Cables, “India’s Relationship with Iran Should not Trouble US,” *The Hindu* (New Delhi), March 17, 2011.

19. Pant, n. 11, p. 253.

Iran to review the Iran-Pakistan-India (IPI) gas pipeline proposal with both the countries.<sup>20</sup> During this visit, India and Iran had “signed a 25-year agreement in Tehran for the annual supply of 5 million tons of liquefied natural gas to commence in 2009, a deal worth [about] \$ 22 billion.”<sup>21</sup> The US was displeased with this development, and expressing strong reservations about India’s Iran policy, sanctioned some individual Indians and Indian chemical companies, alleging that they had made “transfers of technology to Iran that could be useful for Iran’s purported weapons of mass destruction (WMD) program.”<sup>22</sup> The *CRS Report for Congress* pointed out that “in 2003, an Indian chemical industry consultancy, Protech Consultants Private Ltd., was sanctioned under the Iran-Iraq Arms Nonproliferation Act (P.L. 102-484)” and in December 2005, another two “Indian chemical companies (Sabero Organic Chemical Gujarat Ltd. and Sandhya Organic Chemicals Pvt. Ltd.) were sanctioned under the INA [Iran Non-Proliferation Act] for transfers [of technology] to Iran.” Besides, two Indian nuclear scientists, Dr. Surendar Chaudhary and Dr. Y.S.R. Prasad, were sanctioned under the INA in September 2004 on the allegation that they had passed on “heavy-water nuclear technology” to Iran.<sup>23</sup>

Amid all these developments, in 2004, the US signed an agreement with India “to expand cooperation in three specific areas: civilian nuclear activities, civilian space programme and high-technology trade.” Besides, the US and India also agreed to expand “dialogue in missile defense.”<sup>24</sup> And on July 18, 2005, India’s Prime Minister Manmohan Singh issued a Joint Statement with the US President George W. Bush in Washington DC to enable full civil nuclear energy cooperation between the two countries.<sup>25</sup>

20. Ministry of Petroleum & Natural Gas, Government of India, *Natural Gas*, at <http://petroleum.nic.in/ng.htm>

21. P. R. Kumaraswamy, “Delhi: Between Tehran and Washington,” *The Middle East Quarterly*, vol. XV, no. 1, Winter 2008, at <http://www.meforum.org/1821/delhi-between-tehran-and-washington>, accessed May 2, 2010.

22. K. Alan Kronstadt and Kenneth Katzman, “India-Iran Relations and the US Interests,” *CRS Report for Congress*, August 2, 2006, at <http://fpc.state.gov/documents/organization/70294.pdf>, accessed September 12, 2011.

23. Quoted in *Ibid.*

24. “Strategic Partnership Between India and the United States,” Washington, September 17, 2004, *Strategic Digest*, vol. 34, no. 10, October 2004, p. 1426.

25. “India-US Joint Statement,” Washington DC, July 18, 2005, *Strategic Digest*, vol. 35, no. 8, August 2005, pp. 989-91.

The changed US policy towards India came as a result of the need to entice India and decrease India's dependence on Iranian oil. The India-US civil nuclear deal proposal generated considerable domestic opposition and debate in India. However, India's policy-makers, under the pressure of the unavoidable circumstances (that is, the desire to proceed with the civil nuclear deal initiative with the US and the need of US support for India's permanent seat in the United Nations Security Council) voted alongside the US against Iran at the International Atomic Energy Agency (IAEA) in September 2005. The WikiLeaks publication has thrown up new evidence that suggests that India voted against Iran at the IAEA due to its dislike for "another state in the region to become a nuclear power."<sup>26</sup>

India found itself caught in the longstanding contest between the US and Iran, consequently, it undertook "active consultations with all key members of the IAEA Board of Governors and with Iran, in order to avoid a confrontation and promote the widest possible consensus on handling the Iran nuclear issue."<sup>27</sup> However, India did not succeed. Dr. Manmohan Singh's government had come under severe criticism and opposition for voting against Iran at the IAEA, and the US feared that the Indian government would retract from its stand on Iran, thus, it came down heavily on India and asked it to prove its loyalty to the US by voting against Iran at the IAEA. In January 2006, the national and international media carried reports of David Mulford, former US Ambassador to Delhi, publicly warning India that "if [Indian government] opposes Iran having nuclear weapons, [Americans] think [India] should record it in the vote" at the IAEA. He further added that in case India did not vote against Iran at the IAEA, the India-US civil nuclear cooperation initiative was unlikely to materialise.<sup>28</sup>

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26. The India Cables, "199213: Indo-Iranian Relationship: Former Ambassadors to Iran Share Their Views," *The Hindu*, March 15, 2011, at <http://www.thehindu.com/news/the-india-cables/article1538196.ece>; and "195906: Indian Views on Engaging Iran," March 15, 2011, at <http://www.thehindu.com/news/the-india-cables/article1538193.ece>, accessed April 2, 2011.

27. "On the Iran Nuclear Issue," New Delhi, January 27, 2006, *Strategic Digest*, vol. 36, no. 2, February 2006, pp. 197- 98; also see "Statement by India at IAEA (Permanent Representative Dr. Sheel Kant Sharma)," Vienna, November 24, 2005, *Strategic Digest*, vol. 35, no. 12, December 2005, pp. 1628-1629.

28. "India Summons US Envoy Over Iran," January 26, 2006, at [http://news.bbc.co.uk/2/hi/south\\_asia/4649742.stm](http://news.bbc.co.uk/2/hi/south_asia/4649742.stm), accessed January 26, 2010.

These statements of Ambassador Mulford led to sharp reactions from various political parties in India, particularly from the Communist Party of India (Marxist). Surprisingly, even the US State Department disowned Ambassador Mulford's statement and said it was his "personal opinion" and not that of the US government. In view of the continued rise in criticism from its citizens and political parties, Ambassador Mulford was summoned by India's Foreign Secretary, Shyam Saran, and told that his comments were "inappropriate and not conducive to building a strong partnership between the two democracies." Ambassador Mulford, caught in a diplomatic row, tried to play down the crisis, arguing that his remarks had been "taken out of context" and expressed "sincere regrets" to the Indian government.<sup>29</sup>

Yet, in February 2006, India once again voted against Iran at the IAEA, an indication that it had voted under US pressure. The voting which took place on February 4, 2006, recommending that Iran's nuclear programme be referred to the UN Security Council, was approved, with 27 countries, including India, voting in favour of the resolution, three countries (Cuba, Syria and Venezuela) voting against, and five abstaining.<sup>30</sup> Speaking in the Lok Sabha (Lower House of the Indian Parliament) on February 17, 2006, Indian Prime Minister, Dr. Manmohan Singh rejected any attempts to link the India-US nuclear energy cooperation with Iran's nuclear programme, and said, "As a signatory to the NPT, Iran has the legal right to develop peaceful uses of nuclear energy, consistent with its international commitments and obligations. It is incumbent upon Iran to exercise these rights in the context of safeguards that it has voluntarily accepted upon its nuclear programme under the IAEA." He further added that India took the unusual step of voting against Iran at the IAEA because of the "security concerns arising from proliferation activities in [India's] extended neighbourhood."<sup>31</sup> Former Indian Foreign Secretary Shyam Saran, admitted in an interview with Karan Thapar, broadcast over CNN-IBN in the programme titled "The

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29. Ibid.

30. "IAEA Votes to Report Iran to UN Security Council," *The Hindu* (New Delhi), February 5, 2006.

31. Prime Minister Dr. Manmohan Singh, Statement in Parliament on Iran, New Delhi, February 17, 2006, *Strategic Digest*, vol. 36, no. 3, March 2006, pp. 293-95.

Devils Advocate” on March 20, 2011, that the US “did try to persuade India to accept its viewpoint concerning Iran...The [US] tried to convince India that its particular stance towards Iran was the correct one.” However, he strenuously argued that India did not vote against Iran at the IAEA due to the US pressure but because India “wanted there [at the IAEA] to be a full accounting by Iran to the IAEA with respect to [Iran’s] nuclear programme, [the reason being] that Iran’s nuclear programme was linked to Pakistan, was linked to the Democratic People’s Republic of Korea.”<sup>32</sup>

### **INDO-US NUCLEAR DEAL: IMPACT ON INDIA-IRAN RELATIONS**

The US-India bilateral Nuclear Cooperation Agreement (also known as the 123 Agreement) was finally signed on October 10, 2008, by India’s External Affairs Minister Pranab Mukherjee and the US Secretary of State Condoleezza Rice in Washington DC.<sup>33</sup> The Indian government was criticised and even accused by many strategic and security analysts and some political parties of surrendering to the US for “operationalising the nuclear deal” with it,<sup>34</sup> and not following its independent foreign policy. The critics of the Indian government perceived that the Hyde Act which is binding on the Indo-US civil nuclear cooperation, contained a concealed condition. Brahma Chellaney, an eminent strategic thinker and analyst, expressing one such view, wrote, “[U]nlike the existing Section 123 agreements with other countries, the Indo-US civil nuclear cooperation will be uniquely governed by a special, India-specific US domestic law, the Hyde Act.”<sup>35</sup> Exposing what Indian government critics feared, the US Secretary of State Condoleezza Rice said during her statement at the House of Foreign Affairs Panel, “We will support nothing with India in the NSG that is in contradiction to the Hyde Act. It will have to be completely consistent with

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32. For Karan Thapar’s interview with former Foreign Secretary Shyam Saran, see “Mr. Mulford had an Exaggerated Notion of the Kind of Influence the US Exercises in India,” *The Hindu* (New Delhi), March 21, 2011.

33. David Gollust, “US, India Sign Civilian Nuclear Accord,” *VOA*, October 10, 2008, at <http://www.voanews.com/english/news/a-13-2008-10-10-voa66-66731912.html>, accessed September 2, 2011.

34. “Conditions of Hyde Act Remain: Karat,” *The Hindu* (New Delhi), September 7, 2008.

35. Brahma Chellaney, “Escape from Reality,” *Asian Age* (New Delhi), May 14, 2007.

the obligations of the Hyde Act."<sup>36</sup> The disturbing fact about the Henry J. Hyde United States-India Peaceful Atomic Energy Cooperation Act of 2006 is that it contains a prescriptive Article in SEC. 103. Statements of Policy (b) With respect to South Asia, clause (4) stating that the US will "secure India's full and active participation in United States' efforts to dissuade, isolate, and, if necessary, sanction and contain Iran for its efforts to acquire weapons of mass destruction, including a nuclear weapons capability and the capability to enrich uranium or reprocess nuclear fuel, and the means to deliver weapons of mass destruction."<sup>37</sup> Surprisingly, the 123 Agreement signed between the US and India specifies in detail, various issues like the purposes of the agreement; the scope of cooperation; the transfer and protection of nuclear materials, non-nuclear material, equipment and related technology; and the IAEA safeguards, etc., but, there is no mention of Iran in the agreement.<sup>38</sup>

India's Prime Minister Manmohan Singh defended his government's policy of initiating civil nuclear cooperation with the US, arguing, "If India has to grow at the rate of 8 per cent to 10 per cent and, may be, more, India needs rising amounts of energy." He further stated that by 2012, India's total production of nuclear power will not be more than 3,000 MW, and though India has large reserves of coal, it is low-grade coal, with a high ash content. Therefore, the increased use of coal is likely to "run into environment hazards, like CO<sub>2</sub> and other gas emissions."<sup>39</sup> The political crisis between Iran and the US not only affected their relations but also impinged on the socio-economic development and cooperation of the countries of the region. A good example of it is the delay in the Iran-Pakistan-India (IPI) gas pipeline project. The IPI gas pipeline project is aimed at constructing a

36. Quoted in "Hyde Act will Haunt Nuclear Deal at NSG too," *The Economic Times* (New Delhi), February 15, 2008.

37. One Hundred Ninth Congress of the United States of America, "An Act To exempt from certain requirements of the Atomic Energy Act of 1954 a proposed nuclear agreement for cooperation with India." H.R. 5682, at [http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=109\\_cong\\_bills&docid=f:h5682enr.txt.pdf](http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=109_cong_bills&docid=f:h5682enr.txt.pdf), accessed September 12, 2011.

38. Brahma Chellaney, "US-India Bilateral Nuclear Cooperation Agreement (the so-called 123 Agreement)," October 5, 2007, <http://chellaney.net/2007/10/05/u-s-india-bilateral-nuclear-cooperation-agreement-the-so-called-123-agreement/>

39. "Statement of PM in Rajya Sabha on the India-US Nuclear Agreement," New Delhi, August 17, 2006, *Strategic Digest*, vol. 37, no. 9, September 2007, pp. 1144-1155.

1,620-mile (2,700-km) pipeline from Iran's South Pars fields in the Persian Gulf to Pakistan's major cities of Karachi and Multan and then further to Delhi, India. Of the total length of the 2,700-km project, 1,100 km would run in Iran, 1,000 km in Pakistan and 600 km in Indian territory.<sup>40</sup> The IPI gas pipeline project raises great hope and expectation in the region. It was even referred to as the "peace pipeline" by some political and economic analysts because they believed that through economic cooperation, the tension between India and Pakistan, especially the Kashmir issue, could be subdued.<sup>41</sup> Iran took great interest in the development of this gas pipeline (IPI) project and earnestly sought to achieve it because it would give:

- a major boost for job creation and economic prosperity of the provinces on the pipeline route;
- the enhancement of Iran's strategic positioning and standing, both regionally and on a global level; and
- regional economic integration.<sup>42</sup>

The Iranian as well as some Indian politicians and political analysts, especially former Indian Minister for Petroleum and Natural Gas and Panchayati Raj, Mani Shankar Aiyar, strongly supported the project of bringing Iranian natural gas to India through the pipeline passing through Pakistan. However, Aiyar's stand did not go down well with the policy-makers of the US. A WikiLeaks publication indicated that Mani Shankar Aiyar was replaced with "one of India's most right-wing, pro-US, and pro-big business politicians" Murli Deora, during the Congress-led United Progressive Alliance (UPA) government's Cabinet reshuffle in 2006 under the influence of the US.<sup>43</sup> This development let many strategic and political

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40. "Iran-Pakistan-India Gas Pipeline," at <http://www.gulfoilandgas.com/webpro1/projects/3dreport.asp?id=100730>, accessed January 12, 2011.

41. George Perkovick and Revati Prasad, "A Pipeline to Peace," *New York Times*, April 18, 2005 at [http://www.carnegieendowment.org/publications\\_index.cfm?fa=view&id=16789](http://www.carnegieendowment.org/publications_index.cfm?fa=view&id=16789), accessed May 1, 2010.

42. N. Ghorban, "The Iran-Pakistan-India Pipeline Project: Cross-Border Gas Pipeline Challenges," p. 239, at [http://www.igu.org/knowledge/publications/mag/apr-09/igu\\_april\\_2009\\_pages\\_234-back.pdf](http://www.igu.org/knowledge/publications/mag/apr-09/igu_april_2009_pages_234-back.pdf), accessed February 22, 2010.

43. "Reshuffle: Wikileaks Puts Govt. Under Fire," *Hindustan Times* (New Delhi), March 16, 2011; also see Praful Bidwal, "Sacrificing Sovereignty," *Frontline*, vol. 23, issue 03, February 11-24, 2006.

**India is Iran's second largest buyer of oil, second only to China, importing about 12 per cent of its oil needs.**

analysts to believe that the proposed IPI pipeline has become a dream pipeline, not so much for the prices, transit fees and security issues as argued by the Indian government, but mainly because of the pressure from the US against any trade relations with Iran. The US strongly opposed countries carrying out business activities in Iran and imposed various restrictions like the Iran Non-Proliferation Act and Iran-Libya Sanctions Act (ILSA) which comprises sanctions on annual investment in excess of \$ 20 million in Iran's energy sector, making it difficult for India and other countries to invest in Iran. The US has adopted such tough policies because it does not want Iran's "economic lifeline" to be sustained "at a time when the US and its European allies are trying to weaken [Iran] economically." That is why "any attempt by Iran's neighbours and clients to give its energy industry a shot in the arm is viewed by Washington as a quasi-hostile move."<sup>44</sup> Because of the strong opposition from the US, India is finding it difficult to pay for the imports of Iranian oil, leading to huge debts to Iran. It is to be noted that India is Iran's second largest buyer of oil, second only to China, importing about 12 per cent of its oil needs. Iranian officials declared that as of July 2011, India's oil debt to Iran was between \$ 4 and 5 billion. The Iranian government and businessmen, upset with the Indian government for delaying the payment for oil imported from Iran, even threatened to cease further oil supplies to India "unless [India] finds a way to pay for its oil imports."<sup>45</sup> The Indian government, left with little option, worked relentlessly to prevent the cut-off in fuel shipments from Iran and finally succeeded in solving the problem of payment for Iranian crude oil with the help of Turkey, thereby, averting a major political

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44. Institute for the Analysis of Global Security (IAGS), "Iran-Pakistan-India Pipeline: A View from Washington," June 15, 2007, at <http://www.iags.org/n057071.htm>, accessed May 12, 2011.

45. Najmeh Bozorgmehr and Anna Fifield, "Western Sanctions Create India-Iran Impasse," July 20, 2011, at <http://www.ft.com/cms/s/0/db8f3fbe-b2e8-11e0-86b8-00144feabdc0.html#axzz1VqICQyud>, accessed May 12, 2011.

crisis between the two countries.<sup>46</sup> However, India continues to face a tough challenge, being unable to pay the Iranian oil bill, as the banks refuse to deal with Iran for fear of sanctions.

The US sanctions on Iranian oil exports created serious policy problems for India and Iran, but what hurt the Iranians the most was the Indian government's insensitive attitude towards Iran at the IAEA. Iran felt let down by the voting against it at the IAEA, and, Iranian leaders expressed their displeasure towards India's policy by moving away from the past practice of supporting India on the Kashmir issue and began to openly voice their support to the Kashmiris. On September 18, 2010, Iranian Foreign Ministry Spokesman Ramin Mehmanparast condemned India for "the killing of 15 Muslim protesters in Kashmir who were protesting the alleged desecration of the Koran in the US." He said, "[I]t was perfectly acceptable for Muslims to react to the desecration of the Koran and countering such reactions could be interpreted as supporting an act of sacrilege."<sup>47</sup> Two months later, on November 15, 2010, Iran's supreme leader Ayatollah Khamenei, in his Haj message to the pilgrims, described "Kashmir as one of the world's besieged regions."<sup>48</sup>

## DETERMINANT OF INDIA-IRAN RELATIONS

Though, India and Iran do not have any territorial dispute or political hostility with each other, like in the case of India and Pakistan, there have been times when the two countries have taken widely divergent stands on various issues, like the Kashmir issue, thereby, often hindering their good relations. The summoning of the Acting Iranian Ambassador in New

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46. "India to Make Oil Payment to Iran via Turkey: Jaipal Reddy," July 29, 2011, at <http://economictimes.indiatimes.com/news/news-by-industry/energy/oil-gas/india-to-make-oil-payment-to-iran-via-turkey-jaipal-reddy/articleshow/9408662.cms>; and Robert M Cutler, "Bills paid, Iran's oil ships again to India," August 18, 2011, at [http://www.atimes.com/atimes/South\\_Asia/MH18Df03.html](http://www.atimes.com/atimes/South_Asia/MH18Df03.html), accessed October 12, 2011.

47. Iftikhar Gilani, "Delhi: India's Riposte Against Iran," November 19, 2010 at [http://www.tehelka.com/story\\_main47.asp?filename=Ws191110INTERNATIONAL.asp](http://www.tehelka.com/story_main47.asp?filename=Ws191110INTERNATIONAL.asp), accessed July 12, 2011.

48. NDTV, "Iran's Kashmir Remarks Upset India," November 19, 2010, at <http://www.ndtv.com/article/india/irans-kashmir-remarks-upset-india-67367>, accessed May 12, 2011; and Indrani Bagchi, "'Friend' Iran calls India a Zionist Regime," *The Times of India* (New Delhi), November 19, 2010.

Delhi by the Indian government to protest against the Iranian supreme leader Ayatollah Khamenei's Haj message on the Kashmir issue is one such example. The Indian government considered the statements of the Iranian supreme leader as interference in India's "territorial sovereignty" and abstained from voting against a UN resolution criticising Iran's human rights violations.<sup>49</sup> This marked a major shift in India's stand on Iran, because it was for the first time since 2003 that India has abstained from voting against a UN resolution critical of Iran.<sup>50</sup> The strained India-Iran diplomatic relations do not comprise a new development: Iran had joined the US-led military alliance and assisted Pakistan in developing Pakistan's military and defence technology during the Cold War period. Iran had also supported Pakistan on the Kashmir issue on several occasions, much to the disappointment of India. India, on the other hand, was closer to the Iranian leader's arch rival, Egyptian President Gamal Abdel Nasser in the 1950s and 1960s. Besides, India's first Prime Minister, Jawaharlal Nehru, was dead against Iran and Pakistan joining the Baghdad Pact and described it as a "wrong approach, a dangerous approach and a harmful approach." The India-Iran relations seemed to be moving in the right direction after the dethronement of the Taliban regime from Afghanistan, but the ongoing war on terror, the Iranian nuclear issue and the Iran-Israel hostility have affected the two countries' relations.

India is already facing serious policy problems in its relations with Iran because the US wants India to stop importing oil from that country and support its sanctions against Iran to prevent it from carrying out its weaponising programme. Now that Iran-Israel hostility has spilled over to Indian soil, India has been further put in a tight spot. Israeli Prime Minister Benjamin Netanyahu directly blamed Iran for the attack on the Israeli diplomat in New Delhi on February 13, 2012, even though Indian

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49. The UN resolution was proposed by Canada and was adopted by 88 countries voting in favour and 44 against. India alone with 56 countries abstained from voting. See Iftikhar Gilani, n. 47; *NDTV*, *Ibid.*; Sandeep Dikshit, "India Summons Iranian Envoy to Protest Khamenei's Observations on Kashmir," *The Hindu*, November 19, 2010, at <http://www.thehindu.com/news/national/article896744.ece>; and Pranay Sharma, "A Persian Gulf," December 6, 2010, at <http://www.outlookindia.com/article.aspx?268210>, accessed May 10, 2011.

50. Gilani, n. 47; Sharma, *Ibid.*

intelligence had no evidence of Iranian involvement. Some Indians, like Shishir Gupta, Deputy Executive Editor of the *Hindustan Times* too believe that the February 13, 2012, bomb attack on the Israeli diplomat “was unmistakably Iranian and the handiwork of its secretive Al Quds force, with a high degree of deniability built into it.”<sup>51</sup> However, India’s External Affairs Minister, S. M. Krishna treated the incident with utmost caution and said, “... it will be extremely difficult for us [India] to pinpoint who is responsible for the attack, so we will hold our judgment till we get a report.”<sup>52</sup>

**Indo-Iran relations swung from close cooperation to antagonism, and vice versa.**

The Israelis believe that the attack was carried out by Iranians in retaliation for the assassination of Mostafa Ahmadi Roshan, an Iranian nuclear scientist and other Iranian scientists, who were killed mysteriously. In fact, India strongly condemns all forms of terrorist activities, and in principle, does not want Iran to develop nuclear weapons. But that does not merit India isolating Iran. Dipanjan Roy Chaudhury wrote that Israel is “the second-largest supplier of arms [to India] – India buys \$ 1 billion worth of arms annually” from Israel;<sup>53</sup> on the other hand, Iran is the second biggest supplier of crude oil to India. Thus, India cannot afford to be antagonist with either of the two countries.

### **INDIA-IRAN RELATIONS: THE ROAD AHEAD**

The past experience of India-Iran relations has not been a very happy one. The relations swung from close cooperation to antagonism, and vice versa. The history of India-Iran relations post India’s independence, indicated that India-Iran relations are mainly influenced by the political developments that take place in the region and the world at large. It’s a sad reminder that India-Iran relations had seemed to be moving in the right direction in

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51. Shishir Gupta, “Self-Interest Must Guide Our Actions,” *Hindustan Times* (New Delhi), February 22, 2012.

52. “India Treads with Caution, Says No Iran Link to Blast Yet,” *Hindustan Times* (New Delhi), February 15, 2012.

53. Dipanjan Roy Chaudhury, “India ‘Caught’ in Israel and Iran Crossfire,” *Mail Today* (New Delhi), February 15, 2012, p. 11.

the early 2000s, with the two countries signing various joint cooperation agreements for mutual benefit and development. But, with India diverting its policy towards the US, which has branded Iran as one of the members of the “axis of evil,” Iran began to stay aloof from India. It is an irony that India, despite being one of the major countries in the region, with an important role to play in the regional politics, continues to change its policy with the changing political developments taking place in the region.

Kanwal Sibal, India’s former Foreign Secretary, has rightly pointed out that “India’s strategic interest in maintaining productive ties with Iran conflicts with US’ strategic interest in toppling its clerical regime.”<sup>54</sup> Now the time has come for India to adopt a more rigid and stronger political stand on its policy towards its neighbours, especially on Iran. India’s foreign policy must be guided solely by its national interest and not be directed by any external power. It would be unrealistic for India to expect Iran to support its cause, especially on the Kashmir and Afghanistan issues, if New Delhi continues to adopt such a lackadaisical stand on its neighbour’s important domestic and international issues like the nuclear issue. Indian policy-makers also need to take serious note of Iran diverting its policy towards Pakistan, since India desires to build a close partnership with the US, whereas Iran and Pakistan are opposed to the US policy in the region.

BP (a London based global oil and gas company) report has stated that “Iran’s has 137.6 billion barrels of proven oil reserves and 29.61 trillion cubic metres of proven gas reserves. Iran ranks third in the world in oil reserves and second in gas reserves.”<sup>55</sup> India is among the world’s leading gas and oil importers: it imports about 12 per cent of its oil needs from Iran annually. In 2009-10, alone, “India imported about 22 million tons of crude oil valued at about \$ 10 billion” from Iran, recording “the third largest market for Iranian crude” oil.<sup>56</sup> Besides Iran is the only viable corridor through which India can access the energy rich Central Asian region and Afghanistan. Without Iran,

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54. Kanwal Sibal, “India Must Hold its Ground on Iran,” *Mail Today* (New Delhi), February 15, 2012, p. 14.

55. “Iran Implementing South Pars Projects,” December 25, 2010, at <http://www.presstv.com/detail/156997.html>, accessed January 12, 2012.

56. Embassy of India, Tehran, “India-Iran Relations,” January 10, 2011, at [http://www.indianembassy-tehran.ir/india-iran\\_relations.php](http://www.indianembassy-tehran.ir/india-iran_relations.php), accessed June 12, 2011.

India cannot expect to have any good relations with the energy rich Central Asian countries. India's failure to develop good relations with Iran will have a serious impact on the energy supply to India. This does not mean that the Central Asian countries and Iran are the only sources of energy for India. India has acquired a large quantity of oil and other natural resources from other states in West Asia and the Persian Gulf in the past, and of late, Indian public and private oil companies have invested enormously in various other oil and gas producing countries like Russia, Sudan, Vietnam, etc. India can even stop its oil supply from Iran and obtain additional oil supplies from Saudi Arabia to compensate for the loss of Iranian supplies. Yet, India cannot afford to ignore Iran, because Iran, apart from being an important country for India economically, is also an indispensable country that India has to deal with in the region politically. This is primarily because the political crisis in the region, especially in Afghanistan, does not seem to be coming to an immediate end and Pakistan's policy towards India is unlikely to change in the near future. Iran can help India in counterbalancing Pakistan's uncongenial policies of manoeuvring allies among the Muslim countries on the Kashmir issue and in trying to thwart India's role in Afghanistan. The above discussion leads to the conclusion that despite their political differences, India and Iran have robust convergence of economic and political interest and cannot afford to be antagonist to each other. The two countries can derive maximum benefit from each other's friendship. India can provide Iran with "cost-effective intellectual and material assistance in the development of information technology networks, ports, roads, and rail projects,"<sup>57</sup> which the US and other Western powers will not provide it with. At the same time, India can derive maximum economic and political benefits from Iran, which Pakistan will not provide to India.

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57. Fair, n. 17



# THE FISSILE MATERIAL CUT-OFF TREATY: A DEBATE IN PERPETUITY

HINA PANDEY

Ever since President Obama committed towards achieving a nuclear weapon free world at Prague (April 2009), the global zero syndrome seemed to have been catching up in the interactions among many countries. Since the pledge to reduce nuclear weapons till 2014 was taken by the United States, three major international level conferences have accentuated the significance of achieving disarmament. In addition, an international movement towards “The Global Zero” has already acquired endorsement by the United Nations. All this implies for the nuclear non-proliferation regime, the need and urgency to cement the safeguards and verification mechanisms aimed at preventing seepage of checks, leading to diversion of civilian nuclear technology. It is under this backdrop that arms control measures such as the Fissile Material Cut-off Treaty (FMCT) have made a comeback on the international negotiation table. The present article attempts at explaining the current willingness within the United States for negotiating such a treaty based on two factors: (i) the expansion of nuclear energy in the coming years as more countries look towards nuclear power as an alternative energy source; and (ii) a grim record of the nuclear non-proliferation regime acting as a catalyst towards devising newer check mechanisms. The main objective of the paper is to study the FMCT under the larger context of achieving

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nuclear disarmament, the inevitable development of nuclear power and the current non-proliferation regime.

### **BANNING FISSILE MATERIAL: THE WILL AND NECESSITY?**

Since fissile materials such as Highly Enriched Uranium (HEU) and plutonium form an indispensable part of nuclear explosives, the use of these materials even for a peaceful purpose makes them vulnerable for diversion. The idea to ban their production for nuclear weapons capability was given by the Clinton Administration; followed by the UN General Assembly Resolution 1993, which recommended an international body to negotiate such a treaty. Since then, the efforts to negotiate the FMCT have been doing the rounds in the Conference of Disarmament (CD).

It is also since then that the treaty to ban the production of fissile material has been in limbo, mainly for two reasons. First, is the precondition of it being multilaterally negotiated; and second, that the FMCT ought to be made effectively verifiable. In 2009, however, the CD put forward a mandate to begin these negotiations but two years later (2011), the CD almost reached a stalemate, again due to Pakistan's blatant opposition. However, a joint resolution introduced by South Africa, Switzerland and Netherlands in the United Nations General Assembly's (UNGA's) first committee on disarmament demanded an end to the deadlock within the CD.

In the backdrop of these recent developments, combined with the disarmament commitment extended by President Obama in April 2009, some progress to finally negotiate an international treaty to ban the production of fissile material might become visible in the foreseeable future. However, for achieving this, the United States had to consistently push towards such a measure. This would mean one step forward in the right direction of nuclear disarmament. The Obama Administration has indeed set the tone for the United States towards engaging the international community in deliberating on the issues affecting nuclear security. Many nuclear experts also view this time as a ripe moment to negotiate long pending treaties such as the FMCT and Comprehensive Test Ban Treaty (CTBT) that are aimed at delivering the twin goals of nuclear disarmament and nuclear non-proliferation.

There is no doubt that the United States today assigns great importance to the FMCT as a part of the arms control measures. The treaty is viewed as a key mechanism within the nuclear non-proliferation regime. The realisation of the FMCT, according to many experts, would not only bring under control an arms race among China, India and Pakistan but, at the same time, build an international framework for reducing and eliminating future fissile material stocks. By reducing the availability of fissile material, the FMCT would also prevent acquisition of sensitive materials by the non-state actors. All this would construct a strong foundation for further non-proliferation goals. In the longer run, the conclusion of such a treaty would also add a positive environment, facilitating the larger goal of a world without nuclear weapons.

The American nuclear non-proliferation policy, in fact, for a long time had sought to prevent the misuse of these sensitive materials, domestically as well as internationally. In the 1980s, the United States initiated the Reduced Enrichment for Research Reactor (RERTR) programme that was aimed at minimising use of HEU in domestic civilian fuel reactors. The main objective of this programme implies a gradual elimination globally of HEU even for civilian purposes. President Obama reiterated his commitment towards the same during last year's Nuclear Security Summit. The HEU minimisation programmes play an important role in preventing the diversion of civilian nuclear fuel. This objective is further supported by other initiatives such as the Global Threat Reduction Initiative (GTRI). These threat reduction programmes are responsible for the return of US origin HEU fuel from countries that have been engaged in nuclear commerce with the United States. Since the year 2004, under the GTRI programme, more than 320 kg<sup>1</sup> of HEU fuel has come back to the United States with an aim to minimise the possibilities of diversion. At the same time, about 200 reactors worldwide have been converted to Low Enriched Uranium (LEU) fuel reactors. Also, by 2020, around 200 reactors around the world have been targeted under the GTRI initiative to be converted into LEU fuel research reactors.

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1. The Nuclear Threat Initiative, "Past and Current Civilian HEU Reduction Efforts", July 2011, accessed on September 26, 2011, <http://www.nti.org/db/heu/pastpresent.html>

**Non-proliferation efforts over the last few years have become a high priority issue for the United States.**

It is significant that these non-proliferation efforts over the last few years have become a high priority issue for the United States and have been receiving a consistent flow of funding from the US Congress as well. This year too, the US Congress made a 9 percent increase to fund the federal government for the remaining fiscal year 2011. Congress agreed to provide approximately \$2.32 billion to the National Nuclear Safety Administration's (NNSA's) non-proliferation related activities, representing an increase of about \$200 million compared to the previous year's fiscal appropriations.<sup>2</sup> Thus, the efforts aimed at preventing the diversion of civilian nuclear technology at least in the Obama Administration have received increased attention in the last three years.

With regard to discouraging the production of fissile material for military purposes, the United States expects reciprocal action from other countries, as it has already ceased its production. This has become more evident since President Obama came to the White House. The need for such a step leading towards nuclear disarmament has become more pressing, especially after the conclusion of the new Strategic Arms Reduction Talks (START). It was argued that the conclusion of the START might invite similar arms reduction moves by other countries.

The conclusion of START before the nuclear Non-Proliferation Treaty (NPT) Review Conference (2010) was indeed a calculative step: first, the US was successful in projecting 30 percent cutback of its nuclear arsenal as a step towards global disarmament. Second, it helped the United States to convey to other states to do their bit, subtly implying that measures like the CTBT, FMCT are now important.<sup>3</sup> The idea was to divert attention towards matters that would directly invite attention from other non-nuclear weapon states such as India, Pakistan, and Israel. In the recent Conference of Disarmament

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2. Robert Golan Vilella (2011), "Congress Boosts Non-Proliferation Funding", *Arms Control Association*, [Online: Web], accessed on November 22, 2011, [http://www.armscontrol.org/act/2011\\_05/Funding](http://www.armscontrol.org/act/2011_05/Funding)

3. K. Subrahmanyam, "Prospects For a Nuclear Weapon Free World", *Indian Foreign Affairs Journal*, vol.5, no.2, April-June 2010, pp.172-180.

(2011), Rose Gottemoeller herself acknowledged, that the US would like to consider exploring other alternatives to begin FMCT negotiations if the CD languishes. The US Assistant Secretary, Bureau of Arms Control, supported *the idea of robust plenary discussions on broad FMCT issues*,<sup>4</sup> implying a US led role in the expert level technical discussions on FMCT related issues.

It is noteworthy that three years ago, Robert Einhorn a significant figure in the American non-proliferation policy since the Nixon Administration, too, had argued on similar lines. He proposed an alternative arrangement such as the Fissile Material Control Initiative (FMCI) that was targeted at the concerns emanating from the FMCT negotiations. The idea was to offer an alternative solution to ease repeated deadlocks in the CD. As one of the key issues in the CD negotiations deals with “scope over the existing stock of fissile material”, the FMCI would facilitate a multilateral arrangement to enhance security, transparency and control over fissile material stocks. The purpose is to provide an alternative measure to “*any country that possessed fissile material, whether safeguarded or not, and was willing to sign onto a set of agreed principles*”.<sup>5</sup> Further the FMCI guidelines would ask the partners to declare their fissile material stock category, place excess material under International Atomic Energy Agency (IAEA) safeguards and ensure the highest standards of physical protection and accountancy to those stocks, concentrating on the existing stocks of fissile material and banning new production.<sup>6</sup> Thus, in praxis, the FMCI would independently work for the goal of the FMCT in parallel, while the negotiation continues at the CD.

These instances suggest a consistent willingness in the United States to push for efforts aimed at achieving concrete progress with regard to the nuclear non-proliferation regime. In fact, last year’s Nuclear Posture Review (NPR) released by the Obama Administration, uncovered some similar facets in the American nuclear policy thinking. The NPR (2010),

4. 2011 Opening Statement to the Conference on Disarmament, Remarks by Rose Gottemoeller Assistant Secretary, Bureau of Arms Control, Verification and Compliance January 27, 2011, accessed on November 8, 2011, <http://www.state.gov/t/avc/rls/155400.htm>

5. Robert J. Einhorn, “Controlling Fissile Material and Ending Nuclear Testing”, Achieving The Vision of A World Free of Nuclear Weapons: International Conference on Nuclear Disarmament, Oslo, February 26-27, 2008, accessed on November 18, 2011, [www.ctbto.org/fileadmin/user\\_upload/pdf/.../paper-einhorn.pdf](http://www.ctbto.org/fileadmin/user_upload/pdf/.../paper-einhorn.pdf)

6. Ibid.

**The NPR (2010), clearly prioritised domestic and international actions that the United States would adopt in order to counter newer evolving nuclear threats.**

clearly prioritised domestic and international actions that the United States would adopt in order to counter newer, evolving nuclear threats. It also called for “reinforcing the non-proliferation regime centred on the NPT along with IAEA safeguards combined with consistent persuasion of arms control mechanisms such as the FMCT and CTBT.<sup>7</sup> These developments taken together suggest the presence of thinking in the United States that is reflective of providing an impetus towards interdicting the endeavours by any state responsible for converting peaceful nuclear technology to military usage.

In international politics, the behaviour of the big powers matters. It matters not because it may or may not transcend into a stringent foreign policy action, but because it could be useful in anticipating a probable scenario that might emerge in the due course of time. The behaviour of the United States in this respect matters, as it could be interpreted as a way of implicit norm setting for the near future, which the other states might be expected to abide by.

### *Growing Nuclear Energy: A Driver?*

The dawn of the 21<sup>st</sup> century was filled with narratives of a nuclear renaissance characterised by a sudden renewed interest in nuclear energy, leading to increasing international cooperation with regard to nuclear commerce. As the world energy demand in the form of electricity is expected to grow at an exponential rate, combined with the global shift towards low carbon technologies, the prospects of nuclear energy making a contribution towards generation of electricity today, have indeed become brighter.

The green clean energy argument driven by the climate change lobby has also favoured the development of nuclear energy worldwide. The switch towards nuclear energy as clean energy has offered itself as an attractive

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7. Manpreet Sethi “US Nuclear Posture Review” in Jasjit Singh, ed., *Asian Defense Review 2010* (New Delhi: Knowledge World, 2011), p. 20.

alternative for countries planning to diversify their energy needs. Climate change being conceivably damaging would require all absolute means to reduce greenhouse gases. This has added a sense of preventive responsibility which is likely to push countries to maximise efforts that would encourage the growth of nuclear power.

The international trend in generating electricity globally through the nuclear energy route has been catching up, especially in the Asian countries. It is noteworthy that despite the Fukushima accident, India and China have decided to go ahead with their civilian nuclear power development. Both countries have acknowledged the need to address the safety of their nuclear plants, but, at the same time, they plan to continue investing in nuclear power. In fact, "*the world's stock of 443 nuclear reactors could more than double in the next 15 years*"<sup>8</sup>, according to the World Nuclear Association.

Over the last one year, countries such as China, India, South Korea, and France have shown enthusiasm towards the development of their nuclear industry to boost their energy mix, despite the Fukushima disaster. Other countries such as Switzerland, Italy, and Germany<sup>9</sup> that have planned for a phase-out of nuclear power could be seen as more of an exception rather than the rule. The Fukushima accident has indeed pushed the countries to review their safety standards but it would be misleading to suggest that this would ultimately lead to the collapse of the nuclear industry. The end of the nuclear industry that was predicted by many commentators post Fukushima is far from reality.

Nuclear power generation has been increasing continuously as a result of improved performance. *For instance, the share of nuclear power in global generation of electricity increased from 7.8 percent in 1980 to 15.5 percent in 2005, implying an increase of approximately 5.8 percent per annum in nuclear*

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8. "India, China, to Move on With Nuclear Plants," *The NDTV Profit*, March 15, 2011; *The Nuclear Security Newsletter* (The Centre for Air Power Studies), vol.5, no. 11, April 01 2011, p. 21.

9. Germany's phase-out of all its existing nine nuclear reactors should not be viewed as a reaction against Fukushima, as the country has been against nuclear power since Chernobyl (1986), whose meltdown rained down contamination in the southeast of Germany. Also, the country's decision to phase-out nuclear reactors was not entirely new. For details, see Charles D. Ferguson, "Japan Meltdown , But That Doesn't Mean The End Of the Atomic Age," *Foreign Policy*, November 2011, pp.50-53.

**In the recent years, many countries such as Saudi Arabia and United Arab Emirates have expressed interest in acquiring nuclear power plants.**

*power's contribution to electricity generation.*<sup>10</sup> According to the World Nuclear Association's statistics, the coming 20 years would require greatly clean generated electricity; the overall demand of which would likely rise to 76 percent to 2030.<sup>11</sup>

In the recent years, many countries such as Saudi Arabia and United Arab Emirates have expressed interest in acquiring nuclear power plants. Middle Eastern and North African countries such as Jordan have expressed interest in nuclear power plants. In fact, by 2019, Jordan's first nuclear reactor would be operational, adding approximately 1,000 MW to its electricity generation capacity. In Southeast Asia as well, the demand for nuclear power has been raised by countries such as Indonesia, Philippines, Thailand, and Vietnam.<sup>12</sup>

The United States itself has remained motivated enough to continue expanding its nuclear industry despite Fukushima. US Energy Secretary Steven Chu clearly conveyed the need to include nuclear power in the country's future energy mix. Even one month after the Japanese crisis, the United States did not officially identify any area that required immediate action in terms of nuclear safety. On the contrary, US Deputy Secretary Daniel Poneman reiterated American commitment towards nuclear energy. He stated, "*Nuclear power must be considered as a part of any energy strategy.*"<sup>13</sup>

The option of nuclear energy as an alternative energy source would persist for one more reason: the availability of uranium; the high energy density of the uranium fuel combined with the diverse and stable geographical distribution of the uranium resource. "*Uranium is ubiquitous and*

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10. Energy, Electricity and Nuclear Power: Developments and Projections 25 Years Past and Future, IAEA, accessed on November 8, 2011, [www-pub.iaea.org/mtcd/publications/pdf/pub1304\\_web.pdf](http://www-pub.iaea.org/mtcd/publications/pdf/pub1304_web.pdf)
  11. World Energy Needs and Nuclear Power, September 30, 2011, accessed on November 8, 2011, <http://world-nuclear.org/info/inf16.html>
  12. Charles D. Ferguson, *Nuclear Energy: What Everyone Needs to Know* (Oxford University Press, 2011), pp. 64-67; and *The Jordan Times*, "Nuclear Reactor to be Operational in Jordan by 2019", [Online: Web], accessed on November 18, 2011, <http://m.albawaba.com/en/node/394001>
  13. Mycle Schneider, Antony Froggatt, Steve Thomas, "2010-2011 World Nuclear Industry Status Report," *The Bulletin of the Atomic Scientists*, 2011, pp.60-73.

many countries have workable deposits that could be exploited.”<sup>14</sup> Globally, approximately 4.7 million tonnes of uranium remains to be economically exploitable. According to the Nuclear Energy Agency report, sufficient uranium has been identified, implying that even with the current usage rate, uranium would provide fuel supply for reactors for approximately 100 years.<sup>15</sup> Hence, one may argue that growth of the nuclear energy industry is inevitable despite events such as Fukushima. The Japanese nuclear accident has indeed affected public opinion regarding nuclear safety, and the cost at which the nuclear industry ought to be expanded. However, to suggest that this should directly imply a phase-out of nuclear energy is an “*overreaction*”<sup>16</sup>.

**One may argue that growth of the nuclear energy industry is inevitable despite events such as Fukushima.**

The direct relation between the growing demand for nuclear energy and the increasing risks of diversion of nuclear energy, logically creates space for improving, and introducing, more stringent international verification mechanisms. Under this backdrop, it is likely that the larger nuclear non-proliferation goals such as the FMCT will be met. Since 2001 onwards, one of the key elements of the US nuclear non-proliferation policy has been the prevention of access to sensitive material by potential proliferators. The cut-off treaty also in a way contributes towards this goal. By imposing a quantitative limit on the amount of fissile material for military purposes, it reduces its availability for proliferators to divert.

#### *Unmet Expectation by the IAEA*

President Obama’s commitment towards global zero has not only invited international attention but also set the stage for the world community to take subsequent action towards the realisation of that goal. The fact that precisely one year later, Washington held a successful nuclear security

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14. Trevor Findlay, *Nuclear Energy and Global Governance: Ensuring Safety, Security, and Non-Proliferation* (Routledge Publication, 2011), p.9.

15. Ibid.

16. Charles Ferguson, “Do Not Phase Out Nuclear Power: Yet”, [Online: Web], accessed on November 23, 2011, <http://www.nature.com/news/2011/110323/full/471411a.html>

**Experts have argued that the NPT itself indirectly guides the states through a peaceful proliferation cycle of activities by providing them with the right to develop civilian nuclear technology.**

summit is a sign that conveys the American insistence towards global disarmament.

The failure of the IAEA in keeping a check on the nuclear security efforts of the member states is another reason that has created space for efforts to scrutinise diversion of peaceful nuclear technology. For a long time now, issues such as a limited political mandate, combined with member states' reluctance in cooperating towards verification, and differences in opinion have dominated the IAEA's functioning.

It is often argued that the Agency has been hijacked by the West to fulfil their own security needs. All in all one, may conclude that the institution has not been a success due to a number of reasons. Besides political problems, practical monetary constraints have crippled the effective working of the Agency.<sup>17</sup> The IAEA was created in the 1960s with a view to promote the peaceful use of nuclear energy. It was envisioned by the progenitors of the institution that the spread of dual technology for a non-military purpose would serve as a means to ultimately achieve global disarmament. However, the initiative backfired long ago when a number of states acquired weapons capability. Today, numerous factors hinder the effective functioning of the IAEA. The task of maintaining nuclear security under the Agency's guidelines has been conditioned to member states' responses. It has been almost 55 years since its inception; the success rate of nuclear security programmes carried out under the purview of a confined mandate of the Agency is hardly commendable. Experts have argued that the NPT itself indirectly guides the states through a peaceful proliferation cycle of activities by providing them with the right to develop civilian nuclear technology. This had been used by states such as Iran as a cover to convert dual use technology into military ends. As it is, the IAEA could not adequately monitor every site,

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17 Jack Boureston and Tanya Ogilvie White, "Expanding the IAEA's Security Mandate", *The Bulletin of the Atomic Scientists*, vol. 66, no. 5, September–October 2010, pp. 55-64.

and this challenge of monitoring and safeguarding would only multiply if more countries turn towards nuclear energy.<sup>18</sup> The problem is that mostly non-binding and voluntary measures are being used to check the issue of nuclear proliferation. The institutionalisation of the nuclear regime is done in a manner that allows the seepage of strict surveillance of the proliferation activities globally. The international measures launched to prevent nuclear proliferation, thus, transcend into an “intricate constellation of international instruments...*overlapping efforts and initiatives combined with overwhelming bureaucratic burden...that lack consensus on many issues*”.<sup>19</sup> The successful functioning of the non-proliferation regime depends upon the collective endeavours undertaken regularly by countries. A number of small steps in the arms control mechanism would advance the non-proliferation regime, leading to the ultimate goal of disarmament. Many nuclear strategic experts like Stewart Patrick view the failure of the FMCT negotiations as a critical gap in the US led non-proliferation regime. He has argued that since the IAEA cannot possibly oversee every nuclear site, the verification of NPT safeguards ought to be made through an alternative arrangement. A review of the NPT (2010) failed to reach consensus on US efforts to make the Additional Protocol mandatory. The IAEA is the globe’s technical agency in charge of ensuring that countries maintain safeguards on their peaceful nuclear programmes. Safeguards help deter a country from diverting nuclear technology and materials from peaceful to military programmes. The major concern is that safeguards capabilities have not kept up with the increased use of nuclear power and the projected expansion of nuclear power to many countries. In the words of the Bush Administration’s head of the NNSA, “... safeguards equipment is outdated and personnel preparedness declining as the Agency failed to replace retiring experts with new hires.” There is a realisation among many countries regarding the inadequate monitoring of the dual technologies. The failure of the IAEA in effectively keeping a check

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18. Stewart M. Patrick (2010), “The Global Nuclear Non-Proliferation Regime”, Council On Foreign Relations [Online: Web], accessed on August 30, 2011, <http://www.cfr.org/proliferation/global-nuclear-nonproliferation-regime/p18984>

19. Irma Arguello, “Regime Change for Nuclear Security,” *The Bulletin of the Atomic Scientists*, September 2011, Fissile Material Working Group, accessed at <http://www.thebulletin.org/web-edition/columnist/fissile-materials-workinggroup/regime-change-nuclear-security>

**One of the main reasons why the FMCT has not been able to actualise is due to its precondition of being internationally verifiable.**

on diversion of peaceful nuclear technology and the inevitable expansion of nuclear power globally raises the possibility for the United States to consistently provide impetus to long pending arms control measures such as the FMCT. However, as much as there is a need and a willingness for controlling the diversion of civilian nuclear technology in the US, an equal degree of contradiction prevails, which prevents the materialisation of the same.

## INHERENT CONTRADICTIONS

### *Verifiability*

One of the main reasons why the FMCT has not been able to actualise is due to its precondition of being internationally verifiable. The issue of verifiability is important from the standpoint of ensuring the efficacy and credibility of the FMCT regime. Without a check provision on any sort, the treaty would be meaningless. The predicament with this mechanism lies in the verification approach that might be adopted when ultimately the FMCT would be actualised.

For instance, verification could be attempted through two methods such as satellite imaging, which most countries would prefer, or through the process of on-site inspection. Satellite imaging may play a role in monitoring large plants such as in the US and Russia; however, this verification approach would play little role where the surveillance of smaller reprocessing units is concerned. Thus, if effective verification is sought, which incorporates inspection of the smaller units, an alternative approach ought to be addressed. Hence, if one desires to ensure the adequacy of the verification regime, the on-site inspection would be the better method, as it would fill the gap in the verification process that might arise due to satellite imaging. However, the procedure of on-site inspection might have a drawback as conducting the inspection requires the site environment sampling method. This might result in disclosure of sensitive information about the past

plutonium activities of a state. For instance, the power level at which production reactors had operated and how much plutonium the reactors may have produced in the past, especially in the case of reprocessing and enrichment facilities placed side by side. This would mean a potential loss of information that would necessarily not have to be declared under the FMCT. Thus, some nuclear states could worry that sensitive information at their defence-related nuclear processing sites about past plutonium production activities might be revealed.<sup>20</sup>

It is for these considerations of security and losing sensitive data that states are reluctant to accept effective verification of the FMCT, even though it may be deemed necessary for its sound functioning. For instance, the United States does not support international verification of the FMCT; however, it is willing to verify the FMCT through national means and standards. This would be logically unacceptable to other states and strongly against the principle of the supremacy of law. Moreover, one of the prerequisites of the FMCT emanating from the Shannon Mandate demands that the treaty be multilaterally negotiated so that it may be made non-discriminatory in nature. Thus, an effective verification mechanism needs to be sought accordingly.

### *Universality*

It is quite paradoxical that two of the most salient features of the FMCT such as being universally negotiated and effective verifiability have been acting as impediments in its progress. American arms control experts such as Christopher Ford have argued that the FMCT ought to be negotiated bearing the views of all the discussants. The verification rules too would have to be formulated on the basis of consensus of the parties. Under this context, it is likely that the verification rules would be framed on the basis of the lowest common denominator. The kind of verification system that would be likely to emerge out of this arrangement would then reflect provisions that had already been reduced to the least effective standards. It might be

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20. Hui Zhang, 2008, "Should and Can FMCT Be Verified?", *INESAP Bulletin*, April 2008, pp 50-55, accessed on October 25, 2011, [belfercenter.ksg.harvard.edu/files/Hui\\_Zhang\\_FMCT\\_INESAP.pdf](http://belfercenter.ksg.harvard.edu/files/Hui_Zhang_FMCT_INESAP.pdf)

**For the past two years, the CD negotiations have been deadlocked due to Pakistan's opposition.**

possible that further these provisions would weakly reflect similar safeguards as in the Model Additional Protocol of the IAEA. It is important to note that the Additional Protocol is currently in force with *102 NPT states parties, and 32 states-parties have signed additional protocols.*<sup>21</sup> Under this context, an FMCT verification regime reduced to the lowest common denominator would provide alternative safeguards that states would want to adhere to. This would devalue the IAEA Model Additional Protocol and would ultimately undermine the nuclear non-proliferation regime. The FMCT governed verification system would then become an available pretext for the states to decline the IAEA Additional Protocol.<sup>22</sup> In this manner, the FMCT would prove to be counter-productive.

Also, the provision of multilateral negotiations has added a number of overlapping and antagonistic arguments preventing the actualisation of the treaty. Pakistan has already opposed the FMCT on the ground that it compromises the country's national security. Pakistan's representative to the UN, Mr. Raza Bashir, told the first committee of the UNGA's Disarmament and International Security very categorically, "FMCT that purported only to ban future production of fissile material would permanently freeze a strategic disadvantage for Pakistan and was, therefore, unacceptable."<sup>23</sup> For the past two years, the CD negotiations have been deadlocked due to Pakistan's opposition. While Pakistan insists on including the ban not just on future production of fissile material but also on the existing stocks as well, states already possessing huge amounts of fissile material stand against it. India too would be affected in the case of banning of future fissile material production as it does not own hedge stocks. Thus, keeping its security considerations in mind, it could not possibly give in to this arrogation.

21. *The 1997 IAEA Additional Protocol At a Glance*, The Arms Control Association, [Online:Web] accessed on November 4, 2011, <http://www.armscontrol.org/factsheets/IAEAProtoco>

22. Christopher A. Ford (2009), "Five Plus Three: How to Have a Meaningful and Helpful Fissile Material Cut Off Treaty," *Arms Control Association* [online: Web], accessed on November 2, 2011, [http://www.armscontrol.org/act/2009\\_03/Ford](http://www.armscontrol.org/act/2009_03/Ford)

23. Masood Haider, "Ban On Fissile Material Opposed", *The Dawn*, October 13, 2011, [Online: Web], accessed on November 8, 2011, <http://www.dawn.com/2011/10/13/ban-on-fissile-material-production-opposed.html>

Considering the fact that *Pakistan finds the banning of fissile material before capping its weapons related application illogical*,<sup>24</sup> it would be probable to argue that it would seek to maximise its stocks of sensitive material. This, in turn, would raise the security concern for India, the reaction to which would only invite Pakistan to augment its nuclear deterrence; thereby leading to a vicious circle. Ultimately, the cycle of action and reaction would further strengthen the need to press for the FMCT on the negotiation table. If the world is moving towards achieving global disarmament,

Pakistan's augmenting its nuclear deterrence becomes contradictory to the objective. Hence, the idea of limiting one's capability would actually give rise to the maximisation of efforts to build more capability. It is under this backdrop that the FMCT negotiations would remain in perpetual limbo; moving from one contradiction to another, unless a compromise is achieved on the two important facets.

**It is under this backdrop that the FMCT negotiations would remain in perpetual limbo; moving from one contradiction to another, unless a compromise is achieved on the two important facets.**

## CONCLUSION

Even though the United States would consistently push for an FMCT, there are issues that need to be settled in order for it to take final shape. For instance, the scope defining the stock of fissile material that ought to be covered under the FMCT is still pending. Also questions regarding the cost of verification, its sponsorship and its implementation, intensity and standards are not yet settled. Experts are divided on whether the verification ought to be made operable based on the IAEA safeguards implying that the IAEA would be responsible for FMCT verification or to devise a separate verification organisation dedicated to FMCT verification.<sup>25</sup> An

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24. Khalid Iqbal, "Pakistan's Upright Stance on FMCT", *The Frontier Post*, October 21, 2011, Online: Web], Accessed on November 8, 2011, <http://www.thefrontierpost.com/?p=70465>

25. John Carlson, "The Fissile Material Cut-Off Treaty – A Discussion", Australian Safeguards and Non-proliferation Office, International Commission on Nuclear Non-Proliferation and Disarmament, Research Paper, [www.icnnd.org/Documents/Carlson\\_FMCT-090706.pdf](http://www.icnnd.org/Documents/Carlson_FMCT-090706.pdf)

international trend favouring the FMCT is clearly visible. In addition, there is the availability of consistent American will and support. As the world moves towards diversifying energy needs, nuclear energy would sustain its place with an appropriate percentage in the energy mix of countries. As long as countries seek nuclear energy, the dangers related to it being diverted for other purposes would prevail. This would, in turn, facilitate an environment that would invite more stringent control mechanisms. The need for the FMCT that emanates out of the need to bulwark diversion and nuclear proliferation is increasingly evolving; parallel to that are evolving the inherent contradictions of the FMCT. Sure, the consistent will of the United States would continue and that would push towards an FMCT; however, compromises ought to be sought even by the United States itself on any of the issues. The deadlock between the US and Pakistan ought to be solved before negotiations can proceed any further. Also, any possible direction on the progress of the FMCT is difficult to anticipate, especially once the Obama Administration leaves the White House. How will the Republicans handle the questions of verifiability? Once again, the FMCT would be left at the negotiation table. Despite these shortcomings, one conclusion could be derived as certain. The will of the United States towards the eventual realisation of the Fissile Material Cut-Off Treaty under the backdrop of nuclear disarmament has come out clearly in the last two years.

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