National Seminar on Science, Technology and Development in the Himalayas
March 23-24, 2009
Centre for Himalayan Studies, North Bengal University

Science and Technology in the Development Journey of the Darjeeling Himalayas

Roshan Rai

"Science and Technology has always played a key role in the development process in the modern world. It is technology, which has raised the standard of living of the people in any part of the world." *Introduction letter to the National Seminar on Science, Technology and Development in the Himalayas, March 23-24, 2009, organised by, Centre for Himalayan Studies, University of North Bengal*. But, Science and technology is not neutral and dependent on the owner. The one who controls its use, profits. In many instances, the use of science and technology has skewed development path of communities, making some super rich and others marginalized, and in some instances, totally removed from the face of the earth. This point of view is elaborated in this paper on a generalized basis and followed by focusing it on the Darjeeling Himalayas. The paper looks at not only the need of science and technology in development but also the need to look at it from the equity and justice perspective.

The pursuit of scientific knowledge is the eternal pursuit of truth. This pursuit of truth has enlightened us about ourselves, our earth and the universe we live in – the mysteries of life. In the process of discoveries and inventions, our quality of life has dramatically changed. Diseases have been overcome with better health care systems; nutrition has improved with food security; our living spaces more comfortable; communication systems faster, better and more comfortable. The list is endless. Ultimately, the human person lives with a better physical quality of life and longer than what we use to a hundred years ago, all because of science and technological advancement.

This zealous pursuit of truth and the conversion of the knowledge into technology have definitely improved human life. But, this cannot be taken as a generalized truth. Society declared many famous scientists as outcasts, their thinking and discoveries ridiculed and not given its due. Their lives lived in the periphery of society.

The pursuit of truth by the scientist in many instances is for the sake of the truth and truth alone. The mysteries of life have propelled them in their search of knowledge, to the point where a scientist is generalized as eccentric and neurotic. Their search has also been to improve the quality of life.

But, one constantly finds examples of how this quest for truth has been used to destroy life on earth. The number of dead and the death technology gets frightening when one comes to the 20th century, the century which saw exponential growth of science and technology. World War II left 48 231700 people dead. (*http://warchronicle.com/numbers/WWII/deaths*). One talks about the V series and

Tallboy bombs used in this war, a product of science and technology. Human kind should never forget the destruction and its continued aftermath of the two atomic bombs of 6th and 9th August 1945 on Hiroshima ("little boy" name of the bomb) and Nagasaki ("fat man" name of the bomb). "Hiroshima's population has been estimated at 350,000; approximately 70,000 died immediately from the explosion and another 70,000 died from radiation within five years. Though this atomic bomb was considered much stronger than the one exploded over Hiroshima, the terrain of Nagasaki prevented the bomb from doing as much damage. Yet the decimation was still great. With a population of 270,000, approximately 70,000 people died by the end of the year." (*http://history1900s.about.com/od/worldwarii/a/hiroshima*)

Continuing with war, Napalm (naphthenic palmitic acid) is another ugly face of modern warfare. "Napalm appeared fairly late in WWII and was used much more in Korea and later. During the Korean War, the US dropped approximately 250,000 pounds of napalm per day during the three-years (1950-1953). The US used napalm during the Vietnam War [although technically speaking, it was not "napalm" per se because it included neither naphthalene nor palmitate, but instead was the Napalm-B mixture of polystyrene, gasoline and benzene]. To its critics, napalm represented the fiery essence of all that was horrible about the war in Vietnam. Most people still associate napalm with the image of a young girl running with a group of other victims, skin peeling off in layers, after her village was doused with napalm. Images of napalm igniting in jungles, in villages, and on the people of Vietnam are still cultural icons of the era. It is routinely cited along with Agent Orange as an example of American apathy to the cruelty of modern weapons. Nearly 400,000 tons of napalm were dropped on targets in Vietnam." (*http://www.globalsecurity.org/military/systems/munitions/napalm*)

Today one has got used to the discussions like biological warfare, precision intelligent bombs, carpet bombing, all outcomes of science and technology.

Technological failures and industrial accidents have also led to the misery of human kind. Chernobyl accident is one of the many examples.

"The Chernobyl accident in 1986 was the result of a flawed reactor design that was operated with inadequately trained personnel and without proper regard for safety. The resulting steam explosion and fire released at least five percent of the radioactive reactor core into the atmosphere and downwind. 28 people died within four months from radiation or thermal burns, 19 have subsequently died, and there have been around nine deaths from thyroid cancer apparently due to the accident: total 56 fatalities as of 2004. An authoritative UN report in 2000 concluded that there is no scientific evidence of any significant radiation-related health effects to most people exposed. This was confirmed in a very thorough 2005-06 study." (*http://www.world-nuclear.org/info/chernobyl/inf07*)

These examples are incidences which happened in relatively short periods of time in human history and are shocking remembrances of the ugly side of science and technology. But, our lives are constantly touched by the dark side of science and

technology at a very sublime level. Industrialisation, constantly quoted as the only means and end of development has destroyed cultures, communities and the environment. This process of industralisation has been possible only because of science and technological revolution. Our nation is filled with past and continuing examples of development induced displacement of human communities. The world is filled with examples of cultures lost with the march of development. The same way scientists were outcast, development has made outcasts of cultures and communities who do not adapt to these technologies or come in its path.

Environmental degradation is no longer a debatable topic but an accepted fact. It is no longer a marginal discipline but mainstream. Environmental degradation is a direct fallout of the development path that we have adopted.

"Green Revolution", from 1967, brought about food surplus through technological interventions in agriculture in India. Today the same Green Revolution is termed *"*The Violence of the Green Revolution*"* – (*Vandana Shiva 1991*). The very purpose of food security through the technology of green revolution is being overturned with poisoning of the soil and water by agricultural chemicals and salinisation, water table being lowered, increased virulence, increasing gap between the rich and the poor.

This discussion brings to our notice that science and technology is not neutral. It depends on its usage. The scientist might pursue science for the sake of science but its use decides its implication to society. Thus, the ownership of science and technology highly influences its application and its implication.

In the first place money buys science and converts it into various technologies. But one also sees the rising trend of money buying scientists. In the present day free market economy it is all about the market and the money power. Even though the term used is a free market economy, it actually is not free. It is in the hands of a few.

Likewise, the increasingly accepted governance system of the world is democracy: power of, by and for the people. Reality is, power is in the hands of few.

Thus the economic and governance system has a nexus which ultimately means that science and technology is in the hands of a few. The worst part of it is that this equation not only leaves out most, but actually exploits, marginalizes and destroys cultures and communities and the environment.

In order to highlight the argument that science and technology is in the hands of few I would like to quote a few examples.

Climate Change and Global Warming is a reality especially for us living in the Darjeeling Himalayas yet there is constant debate amongst scientists whether it is a natural phenomenon or human induced accelerated change. The whole debate is a result of a few who do not want to take responsibility and bring about a change in their lifestyle.

One cannot deny climate change and global warming is due to the application of science and technology in the present development interventions.

The, for and against tobacco debate is a classic example. For ever article published highlighting the ill-effects of smoking, more would be published by the tobacco lobby not denying the facts but ensuring that the facts get hidden in technical jargon. When science could not fudge the facts anymore, psychological discussions emerged from the perspective of the individual rights of the smoker. Thus, it took ages before the ill-effects of smoking could be universally accepted.

Corporatisation in the free market economy has ensured that health care gets more and more expensive. No more is it a service sector uplifting and improving the lives of the people, but has become a money making machine which respects and treats clients with money only.

The much touted voice of the people, the free press has ended being a medium to increase consumerism and sell unnecessary consumer durables to people who do not need it nor can afford it. The technological revolution in communication is also in the hands of few.

Thus, science and technology, a solution to all the problems of the world, taken out of the socio-ecological context of the world we live in today is a simplistic paradigm. Majority of science and technology is reductionist and not people friendly. Science and technology perpetuates the inequity and injustice of the world we live in for the simple reason that science and technology is dependent on the owner, one who controls it. The one who owns and controls it, profits. The recent trend in profits of the world is the geometric increase in the gap between the rich and the poor.

Thus, in the development discourse and intervention which uses science and technology as the only solution, one sees a skewed development path. A path which increases the inequities and injustices of the world we live in.

To take this discussion further, I would like to explore the Darjeeling Himalayas. Describe the strategic importance of the region and follow it up with examples of science and technology and development as a critique of the existing paradigm.

The Darjeeling Himalayas consist of three hill sub-divisions of Darjeeling, Kurseong and Kalimpong of the District of Darjeeling. Darjeeling is the northern most district of West Bengal neighbouring, Sikkim, Bhutan and Nepal. It is a strategic district because it borders two countries, Nepal and Bhutan and Sikkim, which borders China. It is also the only hill district in West Bengal. The three hill sub-divisions comprise of an area approximately 2417 square km. The district of Darjeeling covers a total area of 2,38,669 sq. km with a total population of 12,99,919; 6,20,596 female and 6,79,323 male. Urban population is 3,96,060; 1,84,061 female and 2,11,999 male covering 69.28 sq. km area. Rural population is 9,03, 859; 4,36,535 female and 4,67,324 male covering 1, 967.80 sq. km area.(*1991 primary census abstract*s).

The *Lepchas* are the original inhabitants of Darjeeling and are animists by tradition. They have their own language but is not widely used. The majority of the people are *Nepali* who are again divided into various groups. These groups have their own dialects and *Nepali* is the common binding language. The Nepali community can be divided into two groups, one with the *Lamaistic* tradition and the other of the *Hindu*. *Tibeteans, Sikkimese, Biharis, Bengalies and Marwaris* make the minority communities. (*Darjeeling Area Statement – Darjeeling NGO Network 2004*) Thus, diverse cultures exist in the Darjeeling Hills.

Darjeeling Himalayas is part of the Eastern Himalayas which has been included among the Earth's biodiversity hotspot. The rationale for this inclusion is that the Eastern Himalayas has multiple biogeographic regions; considerable climatic variability with the topography; large scale climatic variability in the north south axis; and high biodiversity both flora and fauna, even though the region is under studied. (*Ecosystem Profile, Eastern Himalayas Region, Critical Ecosystem Partnership Fund 2005*)

Darjeeling has a large concentration of protected areas in Singalila National Park, Senchel Wild Life Sanctuary, Neora Valley National Park and Mahananda Wildlife Sanctuary with species like Red Panda, Clouded Leopard, Satyr Tragopan, and Chestnut-breasted Partridge. More than 40% of the area is under forest. 4.56% of the population live in forest villages and forest fringe areas.(1991 pca). Darjeeling is rich in non-timber forest products like – *Rubia cordofolia, Piper spp., Daphne cannabina, Panax pseudo ginseng, Swertia chirrata, Aconitum spp., Lycopodium spp. Pycorrhiza spp., Costus spp.,Kaempteria spp.,Morindia spp.,Thysonaelia spp.* The hills have a vast reserve of unexplored medicinal plants. Thus, it is an important gene pool bank of the earth.

The Darjeeling Sikkim watershed flows out of the River Teesta which is part of the rich alluvial Gangetic Plains of West Bengal, the rice bowl.

With the enormous forest cover of more than 40% of the land and more than 20% of the area under tea and cinchona plantations, Darjeeling is a large carbon sink for its relative size.

Darjeeling is also famous for its "Darjeeling Tea", a premium brand that generates foreign exchange for the country as more than 80% of the produce is exported. The other important crops are the Darjeeling Mandarin, Large Cardamom, Ginger and vegetables.

With its rich natural endowments Darjeeling is a premier national and international tourist destination.

Yet, Darjeeling's development needs and concerns have never been properly articulated or given the space for articulation. Development policies and initiatives are not pertinent to the socio-ecological systems of Darjeeling.

Contradictions of Science and Technology, Development and Darjeeling:

Darjeeling is famous for the Darjeeling Himalayan Railway a world heritage site. Its construction started in 1879 and officially opened on 3rd July 1881 to Darjeeling. In its first full year the line carries 8,000 passengers and 380 tons of goods. (*http://www.dhrs.org/dhr_history*) The locomotive is an engineering marvel and the line also has engineering marvels in the Batasia and Ghayabari loops.

Yet, in 2009 many parts of Darjeeling still does not have proper communication facilities with a very poor road network.

"10th November 1897 is a red-letter day in the history of Indian people. On that day, more than hundred years ago, electricity came to Indian life for the first time. The Sidranbong Hydel Power Station, set up by the Darjeeling Municipality, started commercial generation of electricity on 10th November 1897, marking the beginning of electrification in the sub-continent."
(*http://www.ganashakti.com/old/1999/990308/featurenews1*)

"Jaldhaka Hydel Power Station situated in the district of Darjeeling near Bhutan border started its operation with 2×9 MW generating units during the year 1967 at Stage-I, P. H. and 3rd units capacity 9MW commissioned at State-I, P. H. in the year 1972. Stage-II, P. H. of JHP had been commissioned with 2×4 MW generating unit in the year 1983." (*http://www.npec.in/hydel)*

Yet, majority of Todey and Tangta next to the Jaldakha Hydel Power Station is without electricity. Todey bazaar got its electricity connection end 2008. This example can be quoted for the Rammam Hydel Project too which is in Darjeeling. Hydel projects should serve both the local and global needs.

In the River Teesta two large dams for generating electricity are being constructed within the Darjeeling region. (There are more in Sikkim) They are the Teesta Low Dam Stage III and IV. (*http://www.nhpcindia.com/Projects*). The project is called the Teesta '**Low Dam**' even when the dam heights are 32.5 and 30 metres respectively. Low dams have lower environmental standards for clearance. The project is being taken ahead with little transparency, peoples' participation and a one sided shabby environmental impact assessment. It is in a high landslide zone IV and a seismic zone IV to V. (*IEC Darjeeling NGO Network)*In the past two years 2007 and 2008 Stage III had major landslides disrupting traffic in the National Highway 31A the gateway to Sikkim and Kalimpong. (www.*savethehills.blogspot.com*) One needs to note that all essential commodities, including food grains, have to be brought into Sikkim and Kalimpong through this highway. Even with the Sidrabong experience and example of a the nation's oldest sustainable power generation system, the present day intervention followed is not people and environment friendly. When the hills could be dotted with micro projects a mega destructive project is what is invested in.

“Darjeeling faces an acute energy crisis. 70% of the rural population still depend on firewood for their energy needs. (Roy Choudhury 1996). This problem of dependency on firewood for energy needs is further compounded by the amount required per family which is almost double of that of the plains district. A study of forest department in 1984 showed that the annual consumption of firewood per family in the Darjeeling District was 1.03 cum whereas it is 0.519 cum in Jalpaiguri and 0.364 cum in Cooch Behar (neighbouring plains districts of West Bengal). Based on this report the hill sub-divisions of the district consumes 1.03 * 70% of 99 758 = 71 925.52 cum of fire wood annually. This figure is questionable and our estimation of it is that each family consumes a minimum of 10 cum per annum. This does not include the small wood timber which is quite substantial. With this figure the hill sub-division of the district consumes 10 * 70% of 99 758 = 6 98 306 cum of firewood annually. This is the least firewood consumption that is extracted legally or illegally from the existing green cover and does not include the timber consumption. The higher consumption of firewood in Darjeeling could be attributed to the use of firewood not only for cooking, but also to heat homes and for animal husbandry. A large source of firewood is used by the tea garden workers. The people in the *Khasmal* areas extract firewood from their own land and from the forest. But, in the tea gardens this is not so. Under the Plantation Labour Act 1951 and West Bengal State Rules 1956 it is mandatory that the management supply firewood to the permanent workers only. Prior to the West Bengal Estate Acquisition Act 1953 every garden had their own private forest form where part of the firewood and small wood requirement of the garden was met. Today this system is no longer prevalent and the private forest converted to unclassified forest. The management today provide a firewood allowance to the permanent workers. The tea garden settlements (permanent and casual workers) depend solely on the nearby forests for their firewood and small wood needs. All these factors are putting a tremendous pressure on the forest resources of Darjeeling and needs immediate attention. The extraction of firewood is something that can be minimised with proper management and if proper alternatives are provided.” (*Memorandum by the Darjeeling NGO Network to, His Excellency, The Governor of West Bengal, 27/05/2000*). Science and technology can provide the alternatives but there is no corporate or state investment on poor people’s energy needs as there is no profit. Yet in the global environmental degradation benefits of this investment would be tremendous.

The cash crops of Darjeeling – Large Cardamom, Darjeeling Mandarin and Ginger all are diseased. Till date only for the Darjeeling Mandarin scientists clearly say it is the Citrus Die Back Disease. There are improved varieties and practices yet it not the prerogative of the scientist to take it to the farmers, thus most still cultivate the diseased Darjeeling Mandarin as they had always been doing. The story is worse for Large Cardamom and Ginger, nobody is clear on the disease and there is hardly any interest to study them and offer solutions. Yet all the three crops are the main income sources of the farmers.

Darjeeling tea brings in tremendous income, yet the workers who are 35.78% of the Darjeeling population live in squalor, with poor housing, sanitation and health care systems. The green revolution also had its influence in the region with large scale

chemical use in the tea plantations leading to agricultural pollution. There is tremendous scope for science and technology to play a role yet very little is seen.

In every aspect of life there is tremendous scope for science and technology to make a difference in the lives of the people considering the specific socio-ecological systems of the Darjeeling Hills. Be it from clothes for winter; building material which can withstand the cold and dampness of the region, earthquake proof; energy needs; transport system; agricultural needs and food security; waste management systems; conservation of bio-diversity; to needs of differently abled people.

This can happen when science and technology becomes people friendly and not in the hands of a few. Science and technology needs to come out of its haloed portals of existence and become accessible, appropriate and accountable to the people. It needs to reflect life experiences of the majority. The diversity that is the world we live in and the specific socio-ecological systems of a region. There is need to understand that science and technology exists within the various inequities and injustices of the world, thus it takes their colour too. The numerous world examples I have quoted amply proves this point. Even with the strategic importance of the Darjeeling Himalayas, the development journey has been skewed leaving most marginalized. The journey also shows how science and technology has failed to reach the masses. Yet each instance of the failure I have quoted could easily be converted to a positive success story of science and technology. When this happens, science and technology will truly achieve its higher goal of improving the quality of life and fulfill its quest for the truth.

Roshan Rai,
Development Worker,
DLR Prerna,
c/o RCDC, Hayden Hall Complex,
42 Ladenal Road,
Darjeeling 734 101,
West Bengal, India
email: rairoshan@gmail.com
website: www.darjeelingprerna.org