

CLIMATE CHANGE & SUSTAINABLE DEVELOPMENT: ACTS, IMAPACTS & PERSPECTIVE

A Pathway towards Sustainable Social Change : A Case –Study of Sikkim :
India's first organic state.

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ABSTRACT

The reality of climate change is arguably no longer in question. It has been widely demonstrated that developing countries will be especially hard-hit by the changing climate and new interrelated risks. In most countries, climate change is expected to exacerbate existing development challenges through diminished agricultural productivity and food accessibility, enhanced water scarcity, financial insecurity and incidence of illness.

This paper reviews the two approaches to climate change, namely mitigation and adaptation, and examines the complex interrelationships between them, and between climate change and sustainable development. Adaptation is about reducing the effects of climate change on both human and natural systems; and mitigation is about reducing the causes of climate change by decreasing the anthropogenic impact on the climate system. The implications of an apparently warming world clearly mean that there is need for mitigation; but how effective will mitigation be, and how far are we prepared to go, to reconcile conflicting interests and tensions? Despite relatively slow progress, some forms of sustainable development have appeared, and these offer the best hope we have of mitigating human contribution to climate change, and adapting to its consequences. One such experiment is of the state of Sikkim : India's first organic state & its contribution towards sustainable social change. Hoping this paper will initiate a series of serious and productive deliberation on the topic.

Keywords: Action research, Attitude.

Climate change is a pressing issue globally and it calls for a strong governing framework which makes the roles and responsibilities more transparent at every stage. In reality, climate change is here now,

and it is as much opportunity as risk for those who are wise enough to adapt early on. We should be beyond merely recognising the scientific fact of climate change. Credit crunch or not, now is the

time to and the right response and act. The long-term stability of our environment and economy depend on it.

Developing countries are faced with immediate concerns that relate to forest and land degradation, freshwater shortage, food security and air and water pollution. Climate change will exacerbate the impacts of deforestation and other economic pressures, leading to further water shortages, land degradation and desertification. Increasing global temperatures will result in rising sea levels. Populations that inhabit small islands and/or low-lying coastal areas are at particular risk of severe social and economic disruptions from sea-level rise and storm surges that could destroy cities and disrupt large coastal livelihoods. The widespread retreat of glaciers and icecaps in the 21st century will also lead to higher surface temperatures on land and increasing water stress. By 2025, as much as two-thirds of the world population, much of it in the developing world, may be subjected to moderate to high water stress. Estimates of the effects of climate change on crop yields are predominantly negative for the tropics, even when adaptation and direct effects of CO₂ on plant processes are taken into consideration. Ecological productivity and biodiversity will be altered by climate change and sea-level rise, with an increased risk of extinction of some vulnerable species. The populations of the developing

world are more vulnerable as their infrastructure is not strong and extensive enough to withstand a deleterious impact.

Role of developing and industrialized countries in addressing climate change: Mitigation and adaptation

“Adaptation” and “Mitigation” are two important terms that are fundamental in the climate change debate.

Adaptation is defined as adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderate harm or exploits beneficial opportunities. It is an understanding of how individuals, groups and natural systems can prepare for and respond to changes in climate or their environment. According to them, it is crucial to reducing vulnerability to climate change. While Mitigation tackles the causes of climate change, adaptation tackles the effects of the phenomenon. The potential to adjust in order to minimize negative impact and maximize any benefits from changes in climate is known as adaptive capacity. A successful adaptation can reduce vulnerability by building on and strengthening existing coping strategies.

In the global climate change debate, the issue of largest importance to developing countries is reducing the vulnerability of their natural and socio-economic systems to projected climate change. Over time, there

has been a visible shift in the global climate change discussions towards adaptation. Adaptation can complement mitigation as a cost-effective strategy to reduce climate change risks. The impact of climate change is projected to have different effects within and between countries. Mitigation and adaptation actions can, if appropriately designed, advance sustainable development and equity both within and across countries and between generations.

The Inter governmental Panel on Climate Change (IPCC) projects that the global mean temperature may increase between 1.4 and 5.8 degrees Celsius (C) by 2100. This unprecedented increase is expected to have severe impacts on the global hydrological system, ecosystems, sea level, crop production and related processes. The impact would be particularly severe in the tropical areas, which mainly consist of developing countries, including India.

The climate change issue is part of the larger challenge of sustainable development. As a result, climate policies can be more effective when consistently embedded within broader strategies designed to make national and regional development paths more sustainable. The impact of climate variability and change, climate policy responses, and associated socio-economic development will affect the ability of countries to achieve sustainable development goals. The pursuit of these

goals will in turn affect the opportunities for, and success of, climate policies. In particular, the socio-economic and technological characteristics of different development paths will strongly affect emissions, the rate and magnitude of climate change, climate change impacts, the capability to adapt, and the capacity to mitigate.

Public -Private Partnership Model - A Ray of Hope

Thus this paper attempts to highlight the case –study of. Hoping this paper will initiate a series of serious and productive deliberation on the topic.

Sikkim, the first in the world got the Future Policy Award 2018 for bolstering efforts to attain Sustainable Development Goals (SDGs). The Himalayan state of India was conferred with this honour during the World Food Week at headquarters of the Food and Agriculture Organization in Rome, Italy. It is India first organic state under Public Private Partnership model, to mitigate with a holistic approach with genuine efforts of state government.

On January 19, 2016 Prime Minister Narendra Modi declared **Sikkim** as the **first organic state** in the country. He also called the **state** a harbinger of **organic** farming, not only in India but around the world. India's north-eastern state of Sikkim has won the award for the being the **“100 per**

cent organic state” that promotes agroecological and sustainable food systems.

Sikkim became the first state in India to officially announce adoption of organic farming in the year 2003 to ensure long term sustenance of soil fertility, protection of environment and ecology, healthy living and decreasing the risk of health ailments. In 2003, Sikkim stopped imports of chemical fertilizers in the State and since then the cultivatable land there is practically organic and farmers of Sikkim are traditional users of organic manure. All of its farmland is certified organic. At the same time, Sikkim’s approach reaches beyond organic production and has proven truly transformational for the state and its citizens,” the statement said. Embedded in its design are socioeconomic aspects such as consumption and market expansion, cultural aspects as well as health, education, rural development and sustainable tourism.

The policy implemented a phase out of chemical fertilisers and pesticides, and achieved a total ban on sale and use of chemical pesticides in the state. The transition has benefitted more than 66, 000 farming families. The Sikkim tourism sector has benefitted greatly from the state’s transition to 100 per cent organic as the number of tourists increased by over 50 per cent between 2014 and 2017, it said. “As such, Sikkim sets an excellent example of

how other Indian states and countries worldwide can successfully upscale agroecology,” it said. The 2018 Future Policy Award (FPA) commended proven policies that effectively scale up agroecological approaches at local, national and international levels. It celebrated outstanding examples for accelerating the transformative change in the way food is produced and consumed.

Sikkim, which in 1998 became the first Indian state to ban disposable plastic bags, is also among the first to target single-use plastic bottles. In 2016, Sikkim took two major decisions. It banned the use of packaged drinking water in government offices and government events. Second, it banned the use of styrofoam and thermocol disposable plates and cutlery in the entire state in a move to cut down toxic plastic pollution and tackle its ever-increasing garbage problem,”

However, concerns remain about the state’s battle with plastic.

“Instead of plastic bags, people are opting for non-woven polypropylene bags which have a texture of cloth but are, in fact, plastic and people use them thinking that they are eco-friendly. So, the government needs to strengthen implementation more seriously and promote alternative options,” “Also, multi-layered plastics like tetra paks, chips packets are a problem. People eat lot

of instant noodles here, so that is also adding to non-biodegradable waste,” he added.

Having said that, the state is ahead of the national curve when it comes to getting rid of the scourge of plastic.

Organic farming :

Nearly 15 years ago, the state government decided to shun chemical pesticides and fertilisers and return to natural methods of farming. Today, Sikkim has the distinction of becoming the first state in India to go 100% organic in the agriculture sector. Although it had the advantage of never being a state which extensively used chemical fertilisers and pesticides, the turnaround nonetheless has been remarkable. From cutting subsidies on chemical inputs by 10% every year, it eventually banned its use altogether.

Under its ‘Sikkim Organic Mission,’ the government first began by spreading awareness about the benefits of organic farming, after which it offered farmers seeds and manure for the same. It also trained its farmers to adopt organic methods, and slowly but surely, they have embraced the change.

We started building the entire infrastructure that was needed for this massive change. Biofertilizer production units, seed processing units, automated greenhouses, soil testing labs, mobile soil testing labs, cold storage units and food

processing units—all that was needed to complete the organic cycle started springing up in Sikkim,” said one government official to The Better India.

REASONS FOR ORGANIC FARMING IN SIKKIM

Organic farming has been a traditional way of farming in Sikkim adopted by farmer’s science ages. Due to unavailability of assured irrigation, farmers practice rain-fed farming system with an integrated approach. Integrated farming system is predominant in the state with agriculture, horticulture, animal husbandry in perfect coordination. Sikkim is rich in bio-diversity with abundant plant species because of which the soil is rich in organic matter content and makes the conversion easier. The fragile eco-system in Sikkim hills demand sustainable farming practices without depletion of natural resources. It is therefore advantageous for Sikkim to go into organic system of farming keeping in view of protection of soil from degradation. Because projection of environment and ecology and healthy living of the people for generation. There is some other reason also behind Sikkim going organic.

1. Farming under rain-fed conditions with low productivity.
2. Average fertilizer consumption 7 Kg/hectares and negligible pesticides consumption.

3. Rich-Biodiversity – ample scope for a farm production of organic manure, which is the main item in the menu of organic farming.
4. About 15000 hectares area under cardamom where fertilizer has never been used'
5. The total geographical area of the state is 729900 hectares out of which farming is done in about 10.20 percent area and 89.80 percent of the area has not been touched therefore this untouched area is free from chemical affected.
6. Soil is rich in organic matter content which range from 2-7 percent organic carbon.
7. To promote tourism through organic village concept.

STEPS TAKEN BY SIKKIM GOVERNMENT IN A BID TO BECOME FULLY ORGANIC STATE

Sikkim is divided into five agro-climatic zones:- Tropical zone, sub Tropical zone, Temperate zone, sub-Alpine zone and Alpine zone. The main agricultural lands fall in Tropical, Sub Tropical and Temperate zone. The total geographical area of the state is 7,29,900 hectares out of which farming is done in about 10.20 percent area (74,303 hectares) only where all the farming activities taken place and rest of the area constitutes of forest cover, permanent pastures, cultivable waste barren and

uncultivable, land put to non-agricultural use land under miscellaneous trees and groves etc. To convert this agricultural land into organic farming Sikkim can become a fully organic state.

Sikkim has become India's first full organic state by implementing organic practices at around 75000 hectares of agricultural land. This agricultural land was gradually converted to certified organic land by implementing organic practices and principles as per guidelines laid down in National programmed for organic production.

After the declaration few programmes of organic farming were launched –

- Adoption of Bio-villages.
- Subsidy Reduction on chemical fertilizer:- Subsidies on chemical fertilizers and pesticides reduced at the rate of percent every where to make these inputs costlier and discourage purchase of chemical fertilizer.
- Stopped lifting of government of India quota of fertilizer and pesticides.
- Closed all sale points and outlets.
- Requested transport department not allow transportation of fertilizers and pesticides from outside the state.
- Alternative certified organic manures purchased and made available to farmers.

- To encourage on farm production of inputs large numbers of rural and vermicompost units subsidized.
- Eight units of vermiculture hatcheries were established in five government farms and three KVKS.
- Four plant protection an integrated pest management (IPM) laboratory established.
- Large scale training and orientation programmes organized.

While transitioning to an organic state was no small feat, the task was easier given the size of the state and agriculture land. Sikkim is one of the smallest states second to Goa, with total geographical area of 7.096 square kilometers. Farmland is a little over 10 percent of the total area. The government was tasked to bring some 75000 hectares under the cover of organic farming. Sikkim has the smallest population with a little over 6 lacks.

According to the government of Sikkim, farmers in Sikkim also use much lesser quantity of chemical fertilizers compared to other states 7 to 10 kg/hector. Per annum compared to national average of 70 kg/hector. Over the time the state government eliminated subsidies for chemical fertilizers. Despite this some of the crops have never encountered chemical and have been growing at the strength of organic input this has matter the organic movement easier. Green revolution launched in India in

the early seventies, but mountainous state like Sikkim and other north eastern state where basically agriculture is rain-fed, the chemical use did not have significant impact on production and productivity. Considering all these aspect the government of Sikkim took a decision to adopt organic system of farming in the entire state and probably the first state in India to bring resolution in the state assembly to convert entire state into organic by 2015.

The state first initiated this journey by endorsing multiple efforts planning all sales of pesticides and chemical fertilizers. This left local farmers with no option but to go organic. Then two days workshop with expert in the organic fields and scientists assisted farmers in making this transition. By utilizing the framework set forth by the government agency which deals with organic accreditation, the National program for organic production Sikkim has eliminated the use of pesticides, chemical fertilizers and GMO's and replaced these practices with working in conjunction with the local eco-system to preserve biodiversity and prevent erosion. Being a small state the land holding of farmers are very small. So organic farming has become an appropriate option for Sikkim. Becoming the 100 percent organic the costs that go into segregating, packaging, labeling and differential pricing are saved. When everything is organic, the price

automatically falls, become ordinarily in organic a retain deals with small quantities from a wide range of farmers. The supply chain is broken and discouraged, this adds the cost of produce. It organic marketed well it will also boost the tourism industry in the state. In this day and age of heightened environmental awareness a fully organic state is definitely gold worth. There were worries of production falling due to the heavy costs involved in the transition. The farmers were barely sustaining themselves. So questions were raised about feasibility of using indigenous technologies like pheromone loops to control fruit- flies, bio-pesticides, bio- fertilizers and natural alternative like compost and manure made from dung , decayed leaves and dry grass.

Though the challenge looked insurmountable the government involved the local park in its vision. They included organic farming as a subject in the school curriculum , initiating compulsory training on organic farming and its advantages as part of capacity building and started to spread awareness on the why, how, what of the vision. The state thrive on sustainable farming without destroying its unique drivers flora, fauna and wild life habitat ultimately convinced its people to embrace the change.

Over the past 13 year, around 75000 hectors of land has been converted into certified organic farm following the

guidelines prescribed by the national programme for organic production and finally in January 2016. Sikkim state was officially announced as the country's first fully organic state. The farmers in the state are using natural manure from cow in place of chemical fertilizer and pesticides or insecticides. The Sikkim can be emulated by the other states in the country especially those states which are focusing on agricultural practice which are focusing on agricultural practices.

Combating climate change will require mobilization of substantial resources. Success will depend on the establishment of mechanisms and approaches that incentivize the mobilization of resources for cost-effective and ambitious climate action at all levels. Cooperation between countries and between private and public-sector stakeholders is considered crucial. Thus government can plan to follow a certain path towards arranging the funds which provides incentive for the private sector.

The convergence will benchmark on the key advantages of the different agencies. While the community involvement and grass root level problems which can be identified by the social organizations, there problems can be addressed through project development and provision of sufficient funds from public and private funding. Channeling and incentivizing green funds is

essential in this context. Working groups, specific to industries, can be set-up for prioritizing inclusion of DRR and climate change adaptation. Government should give incentives to private sector for innovative PPP adopting green technologies through tax benefits, revenue subsidies etc. Such PPP models could be useful for pooling resources and expertise and for up-scaling climate change mitigation and adaptation initiatives.

Corporate level disaster policy and climate change adaptation compliance can also be formulated at national level by Government. Tool kits for PPP models for concerned sectors should be made available by Government – such kits need to be comprehensive dossiers indicating model concession agreements, risk and revenue sharing framework etc.

Detailed action plans under NAPCC should be prepared by Government in collaboration with private sector and civil society organizations. It is important that all decisions on climate changing are made in coordination with all concerned ministries and departments, and involve state planning commissions to align action plans. Government can create a welcoming investment environment through overall policies geared to the ease of doing business by giving incentives to private sector for innovative PPP adopting green technologies through tax benefits, revenue subsidies etc.

They must work together closely to reduce vulnerability to climate change while enhancing economic growth and development for the country.

Market place and incubation facilities to upscale small and grass root innovations for sustainable models for climate change adaptation should be promoted by Government. Small infrastructure projects promoting alternative energies, non-conventional waste management technologies and green technologies can be promoted with active participation of private sector and civil society organizations. Development of flagship programmes to promote and support the establishment of a global network of national clean technology accelerator programmes as an effective platform to catalyse and accelerate innovations in clean energy and environmental technology in the SME sector, by leveraging the knowledge assets accrued.

A public policy for corporate social responsibility should be formulated at national level considering disaster risk reduction and climate change adaptation measures Sikkim in spite of achieving the full organic state, it has to continue its effort to maintain the status. For that it has to continue the certification programme. Certification also adds trust and provides support to the value addition industry.

Hence let us get future certificate processes organized properly with the least amount of cost of the farmers. Let us get out marketing right and move to higher value addition and branding our value chain must be properly lubricated for minimum commercial friction and finally let us get young people to the organic farm.

Thus in recent decade there has been a growing awareness of how intricate the interactions are between human beings and the environment. Fortunately, progress has been made in understanding this relationship, and new technologies have been effective in addressing environmental problems. However belatedly, there has been an acknowledgment of the incompatibility of the world's finite resources with humankind's increasingly greater needs for them, and of how such a challenge demands broadened collaboration among engineers, social scientists, politicians and financial powers.

Global agreement that the essential issues of the twenty-first century cannot be solved by any one discipline has led to the concept of sustainability. The trans-disciplinary contributions address these concerns with an overview of the diverse fields of study related to sustainability. This collection of work is intended to pave the way for further collaboration among scientists and nations as well.

“NATURE , HUMAN BEINGS & CULTURE constitute an amazing & abiding triangle.....through a persistent manipulation & sculpting of natures , human beings create their SOCIAL MILEU.” - First Citizens 'Report on Environment.

Lets salute the efforts of the Sikkim Government to make this world “ A REAL SOCIAL MILEU.”

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