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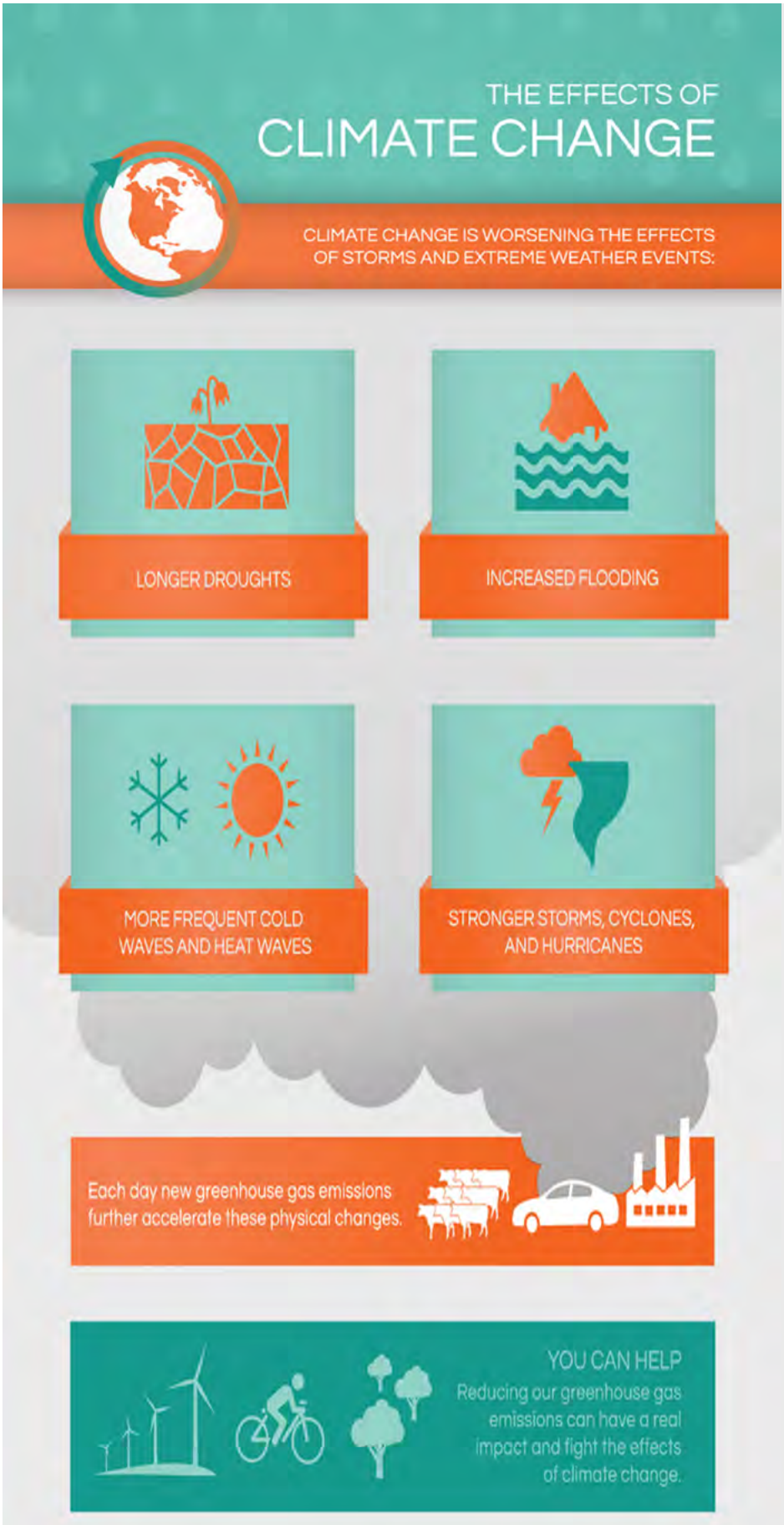
INSIDE



Source: whatsyourimpact.org

CLIMATE CHANGE IN THE EASTERN HIMALAYAN REGION

The Eastern Himalayan region is spread over five countries, namely, Bhutan, China, India, Myanmar and Nepal. The region, with its varied geopolitical and socioeconomic systems has been home to diverse cultures and ethnic groups alongside encompassing immense natural resources, rich forest cover, assorted biodiversity and numerous species of medicinal herbs and plants. The region's complex topographical layout has given rise to varied vegetative patterns and provided reproductive isolation for many species of flora and fauna, thereby creating rich biodiversity hotspots. The unique topography of the Eastern Himalayas has also led to the creation of different bioclimatic zones in the region.

The North Bengal hills and North Eastern states of India that fall within this region provide a window into this highly heterogeneous natural world of the Eastern Himalayas. Evidence of its diversity can be seen in the 8000 species of flowering plants, over 816 tree species, 675 edibles and nearly 1743 species of medicinal value that are found here. A review conducted by the Critical Ecosystem Partnership Fund (CEPF) revealed that the Eastern Himalayas are home to a large number of globally significant mammals (45 species); birds (50 species); reptiles (16 species); amphibians (12 species); invertebrates (2 species); and plants (36 species). The majority of these species (about 144) are found particularly in the North Eastern states of India.

It has been widely noted that mountains make for fragile environments and any alterations in climatic conditions would have far-reaching impact on the ecosystems that are sustained by them. As a repository of biodiversity and ecosystems, the Eastern Himalayan region is also a sanctuary for many endangered and endemic species. The onslaught of climate change affecting the world today, which entails more severe weather, longer droughts, higher temperatures (milder winters), heat waves, changes in local biodiversity, and reduced ground and surface water quantity and quality, will be felt gravely in these regions. Climate change threatens to make the already fragile ecological balance of the region all the more vulnerable, while at the same time, increases risk of natural calamities, jeopardises food security and raises health risks for its local populations.

This region is also a critical from the point of view that the Hindu Kush-Himalayan ranges contain the largest accumulation of snow and ice outside the polar region; and is the source for ten major Asian rivers, including those that flow through the subcontinent namely, Brahmaputra, Ganga, Yamuna, Kosi, that flow towards the east and the Indus, Sutlej, Ravi, that flow towards the west. Even a 1 degree Celsius increase in temperature in the Himalayas, will have extensive impact not only on the mountainous regions but also on the northern river-plains that depend largely on them.

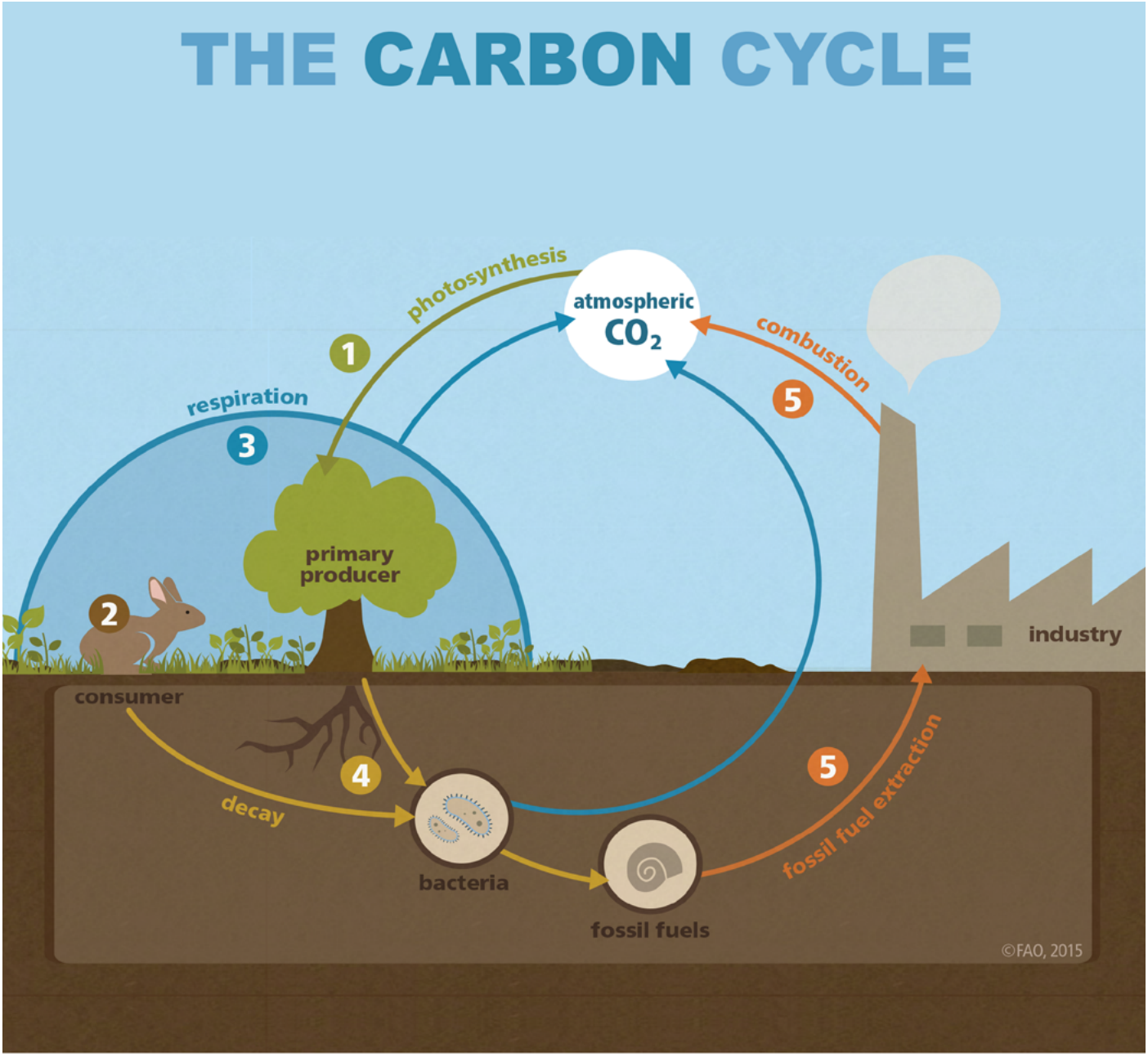
Additionally, political alliances between countries of the subcontinent are dependent in a significant way on these trans-border rivers. As a result, the impact of climate change on the hydrological cycles here will also have a profound bearing on the political texture of the region. Refugees of climate change, no longer a predicament of the future but a reality that is unravelling in our lifetime, crossing national boundaries for survival will put under further duress political ties between nations in the region.

It becomes fairly evident how everything from ecosystems to political relations in the Eastern Himalayan region gets implicated in a discussion around climate change. With this dedicated issue on 'Climate Change' we aim to foreground the urgency with which we need to collectively work towards limiting climate change and hope that in a humble way we have been able to open up the conversation from where we may arrive at solutions.

Ranjit Barthakur, Chairman,
APPL Foundation

Biodiversity in Assam and North Bengal

THE CARBON CYCLE



THE CARBON CYCLE

1. Plants use carbon dioxide from the atmosphere, water from the soil and sunlight to make their own food and grow in a process called photosynthesis. The carbon they absorb from the air becomes part of the plant.
2. Animals that feed on the plants pass the carbon compounds along the food chain.
3. Most of the carbon the animals consume is converted into carbon dioxide as they breathe (respiration), and is released back into the atmosphere.
4. When the animals and plants die, the dead organisms are eaten by decomposers in the soil (bacteria and fungi) and the carbon in their bodies is again returned to the atmosphere as carbon dioxide.
5. In some cases, the dead plants and animals are buried and turn into fossil fuels, such as coal and oil, over millions of years. Humans burn fossil fuels to create energy, which sends most of the carbon back into the atmosphere in the form of carbon dioxide.

Source: Food and Agriculture Organization (FAO) of the United Nations.

Climate Change and Organic Agriculture

The primary objective of agricultural activities is to produce sufficient quantities of food to feed the world's population. Not only has conventional or 'business-as-usual' approach to agriculture failed to meet the global demand for food, it has also been an obstacle in the way of combating climate change.

The relationship between agricu-ltural production processes and climate change is indisputable. Equally evident is the fact that organic and conservatory agricultural practices are the only sustainable means by which we can seek to increase production and stall climate change, in the long term. Organic agriculture therefore, plays a critical role in addressing two of the most urgent crises facing the world today, namely that of food security and climate change.

The carbon cycle forms the core of our understanding of climate change. It refers to the exchange of various forms of carbon between the atmosphere, oceans, terrestrial biosphere and geological deposits. Carbon dioxide in the atmosphere, rising levels of which significantly contributes to climate change, is primarily produced by biological reactions that take place in the soil. An effective way of minimising carbon content in the atmosphere is through the process of carbon sequestration, where the soil itself absorbs and retains carbon. However, with the clearing of grasslands and forestlands for conventional agriculture and grazing purposes, there has been an acute loss of soil carbon. Soil carbon losses caused by agriculture account for a tenth of total CO2 emissions attributable to human activity since 1850.

Conventional agriculture is a major contributor to climate change in yet another way. The dependence on chemical fertilizers within the conventional approach has resulted in greenhouse gas (GHG) emissions in the atmosphere. A study conducted by the University of California, Berkeley, has found that increased fertilizer usage over the last 50 years has led to a dramatic rise in the level of nitrous oxide, a major GHG contributor to climate change. According to the Intergovernmental Panel on Climate Change (IPCC), the annual amount of greenhouse gasses (GHG) emitted by the agricultural sector is 10 to 12 % of global emissions. The main GHGs emitted through agriculture accounted for by the IPCC are nitrous oxide (N2O) and methane (CH4).

Climate change, agricultural practices and food security are inextricably connected in our present context. According to the Food and Agricultural Organization (FAO), climate change represents a serious threat to global food security. Changes in temperature and rainfall patterns affect the organic matter and processes that take place in the soils. This, in turn, has an impact on the plants and crops that grow from them. For us to restrict climate change and commit ourselves to the issue of food security for all, a paradigmatic shift

Paddy planting in progress near Bhelaguri tea plantation, Assam ©APPLF

Rainwater Harvesting in Udalguri village of Assam ©APPLF/Sinjini Mukherjee

needs to take place in the way we think about and practice agriculture.

Organic agriculture offers a farming system that can affordably recapture carbon from the air and effectively re-store it in the soil. Unlike the carbon released from fossil fuels, soil carbon store has the potential to be recreated to a substantial degree if appropriate farming practices are adopted.

FAO states that improved agriculture and soil management practices (that increase soil organic carbon), such as organic farming, agro-ecology, conservation agriculture and agroforestry, produce fertile soils that are rich in organic matter (carbon), keep soil surfaces vegetated, require fewer chemical inputs, and promote crop rotations and biodiversity. These soils are also less susceptible to erosion and desertification, and will maintain vital ecosystem services such as the hydrological and nutrient cycles, which are essential to maintaining and increasing food production.

The International Federation of Organic Agriculture Movements (IFOAM) contends that organic agriculture enhances biodiversity, protects our fragile soils, improves the nutritional quality of food, ensures high standards of animal welfare and provides increased employment in rural areas. At the same time, organic agriculture reduces GHG emissions and fossil fuel energy use, cuts nutrient and pesticide pollution and stops potentially harmful pesticide residues entering our food chain. Organic agriculture builds resilient farming systems capable of combating climate change and securing local food supplies and is highly effective in sequestrating carbon. Today, the benefits of going organic are gradually being brought within mainstream discussions on agricultural practices the world over.

According to figures published by IFOAM, 78 million hectares (agricultural and non-agricultural areas) spread over 170 countries was organic in 2013. **Asia was recorded to have a total of 3.4 million hectares of organic agricultural areas, which constitutes 8% of the world's organic agricultural land. India has the second largest organic agricultural area in Asia at 0.5 million hectares as of 2013, while it is the world's leading country in organic production with 650,000 producers. It is also interesting to note here, that about the quarter of the world's agricultural land (11.7 million hectares) and more than 80% of the world's organic producers come from the developing countries and emerging markets.** These figures provide evidence to the positive trends that are taking shape in the world towards combating climate change alongside ensuring measures for providing food security. Organic agricultural practices have been emphasized by experts and stakeholders in the global discourse on climate change as the only viable and sustainable option available to us in the face of challenges set by climate change and the threat to food security.

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My Experience with Inhana Rational Farming Technology

An Ecologically and Economically sustainable Organic Package of Practice in the backdrop of climate change mitigation.

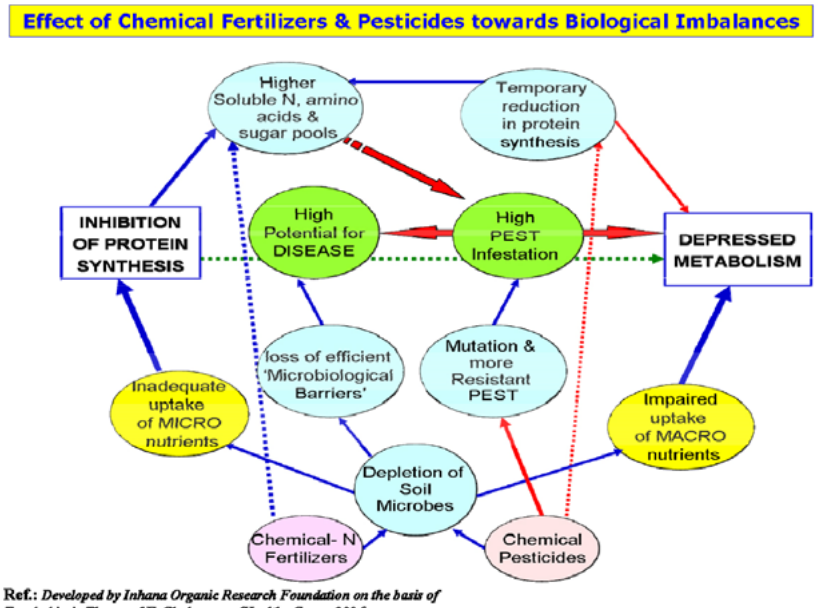
Vicious cycle of chemical farming is now exposed with increasing crop un-sustainability, higher input requirement, poor soil quality as well as recurrent pest and disease infestation. Moreover, in the pretext of climate change yield interference has become quite predictable under the unpredictable weather conditions vis-a-vis hike in biotic potential. In the present scenario need for a nature friendly Package of Practice (POP) for restoration of the much desired sustainability; has been laying heavily on the agricultural fraternity and scientist alike. The desired Road Map has been indicated as Organic Approach, and IFOAM (2009) too pointed out its significant role in addressing two of world's biggest and most urgent issues – (i) Climate change and (ii) Hygienic food security.

For some years now different organic inputs have been tested in a wide variety crops, under scientific experiments and large scale exercises as well. But crop loss and hike in Cost of Production (COP) has been noticed irrespectively. Under the present degradation of resources how the organic inputs, which are relatively weaker substitutes of chemicals can influence desired crop performance or soil rejuvenation; are the queries that have continuously agitated me as an Agronomist.

At the same time it seemed more logical that under the existing complexities deliverance of success in a time bound manner could be brought about only by a comprehensive POP with steps of management that work in absolute harmony with each other as well as the surrounding ecology.

My appraisal of Inhana Rational Farming (IRF) Technology started with FAO-CFC-TBI Project entitled 'Development, Production and Trade of Organic Tea' (at Maud Tea Estate, Assam; period: 2008-2013) as a member (on Honorary basis) of the Advisory Board constituted for the project by Inhana Biosciences. The research findings, perhaps the most exhaustive database on organic crop production in India, gave me an insight into the pros and cons of the different organic methods/ POP's and brought forth IRF Technology as a scientific yet most convenient method for organic crop production in terms of highest crop performance and speedy soil quality rejuvenation at lowest economics; under all the growth phases of tea plant viz. mature stage, young stage, newly planted and nursery. Further quest revealed time tested effectivity of the technology in world's first 'Carbon Neutral' plantation i.e., 'West Jalinga Tea Estate', where crop sustainability has been maintained (for more than a decade now) despite low resource availability and at lowest COP, not only with respect to other organic tea gardens, but conventional gardens as well. Bio-diversity Marker Study (collaborative study by Dept. of Ecology & Environmental Science, Assam University, Dept. of ASEPAN, VisvaBharati University and Inhana Organic Research Foundation) indicated significant improvement of ecological diversity in the tea estates under IRF Technology as compared to good conventional tea estates. Presently the technology has been adopted by several progressive tea estates to bring down their pesticide usage, leading to about 40 lakh kg Low 'Pesticide Foot-print' Teas in 2014 with about 55 lakh kg made tea under the programme in 2015. Hathikuli Tea Estate, one of the oldest organic tea estate in the Assam, has also adopted this Technology to add 'Sustainability' to it's organic programme.

Results from tea related experiments as well as large scale organic production from the plantations over a period of years have enabled clarity regarding the effectivity of IRF Technology in this sector. But being the faculty of main stream agriculture, there was always greater interest to understand the performance of this organic POP in



Ref.: *Developed by Inhana Organic Research Foundation on the basis of Trophobiosis Theory of F. Chaboussou (Healthy Crops, 2004)*

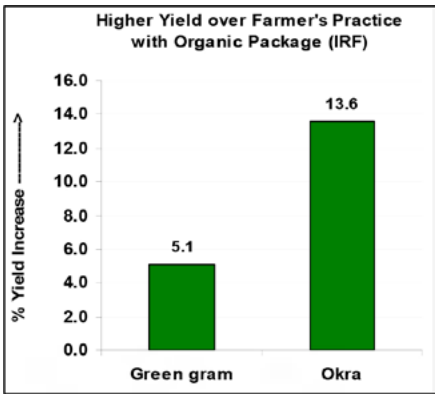
Trophobiosis theory of F. Chaboussou (a renowned French Scientist) for the first time pointed out that application of Chemical fertilizers and pesticides depressed plant vitality giving birth to the 'Seed of Un-sustainability'. The flow diagram developed on the basis of his lifelong experiments, show in a simplistic manner, how application of synthetic inputs invite more pest and negatively impacts crop productivity due to weakening of two inherent qualities of the plant system i.e.

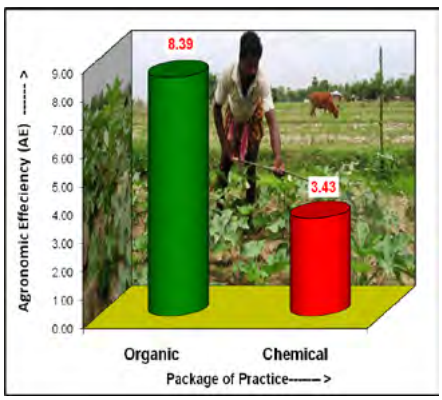
(i) Sense of Self- nourishment and

(ii) Sense of Self- protection.

Development of healthy tea seedlings under organic management is still considered a challenging task. Association with a study on the comparative impact of conventional farming vis-à-vis organic POP (IRF Technology) on tea seedling quality further strengthened my perspective on organic farming. Better seedling quality in terms of Dickson Quality Index, total nutrient uptake, leaf area index etc. was documented under organic POP; further well correlated with post transplantation survival as well as plant development even under unpredictable climatic situation. The results substantiated that success under organic can be ensured only by a pathway that is based on scientific principles and functions in tandem with Plant Physiology, Philosophy and Ecological Interrelationships; bringing about comprehensive relief.

different agri-horticultural crops. Motivated by the results I too designed elaborate experiments for studying not only the effectivity of IRFtechnology as an organic POP, but moreover to assess its contributive potential towards establishment of different 'Sustainable Cultivation Models' including 'Zero Pesticide Foot-Print Concept'.Different test crops like paddy, baby corn, green gram and okra (representing cereals, pulses and vegetables) were taken for the study, which has conclusively exhibited the potential of IRF Technology not only towards better crop performance and speedy soil quality development but more importantly higher nutrient use efficiency of the plant system has been indicated, at viable economics, which is quite often lacking in case of conventional organic farming practice.



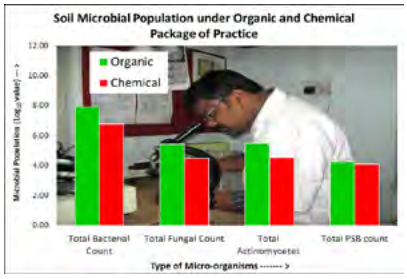


Evaluation of yield increase under organic POP (IRF Technology) as compared to conventional practice w.r.t. green gram (Vigna radiate) and okra (Abelmoschusesculentus (L.) Moench.) Comparative Study of Agronomic Efficiency under Organic (IRF Technology) and Chemical Package of Practice taking Okra (Abelmoschusesculentus (L.) Moench.) as test crop.

In the present context of climate change, it is well understood that unpredictability of weather will be constant every year and simultaneously stress on plant physiology and higher pest and disease problems will now be a lasting phenomenon. Hence, Sustainability and Resilient Plant System are becoming synonymous, but at the same time there has been hardly any cultivation method or POP which signifies the relevance and acts towards building up Plant Resilience, except in case of Biodynamic Farming which does so in parts. But again due to lack of comprehensive approach the method fails to reciprocate effectivity neither in terms of crop performance nor in terms of soil quality restoration.

Concept of 'Feed the Plant' as in chemicalized farming practice has now shifted to 'Feed the Soil', which is being harped on by the present organic POP's. The lack of success in the present organic scenario could be primarily accounted for the dearth of quality organic soil amendment as well as poor nutrient use efficiency of the plant system due to depressed physiology. The importance of plant management towards activation of plants' Inherent Bio-chemical functions is totally overlooked under the present organic practices and conversely is the reason behind success of IRF Technology.

In my understanding, success of IRF Technology has been built on two founding pillars, a comprehensive plant management practice referred as 'Energization of Plant System' which works towards Activation of Plant Physiology leading to Plant Resilience; well supported by an effective soil management programme referred as 'Energization of Soil System', which serves towards enlivening of the soil for restoration of soil dynamism.



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The Impact of Climate Change on Quality of Tea and Livelihoods in the North East of India

Globally agricultural landscapes and food systems are experiencing multiple stresses including increased competition for land and water resources. Assam is a state with great economic importance in the tea trade and nearly 35% of the state populations livelihoods are dependent upon tea production. Changes in regional climateprovide a potential threat to the production of Assamese tea, both in terms of quality and quantity.

Tea is grown across the north-east region in parts of Assam,Terai, Dooars and Darjeeling . The state of Assam is one of most globally important tea-producing regions of world manufacturing high-end graded tea which contributes to around 17% of world tea production and annually produce more than 50% of India's total tea. Around 2 milliontea laborers in Assam are dependent upon high tea yields, both in quality and quantity. Approximately 75% of tea crops are cultivated in plantations and 25% through smallholder plots.

Tea is a rain-fed perennial crop and is an important beverage crop in the world, supporting livelihoods across the humid regions of south Asia , south-east Asia and east Africa.

The relationship between tea yield and climatic factors implies that long-term climate change will impact the key physiological and developmental processes that determine the yield of tea.

Regional trends indicate annual mean minimum temperatures have increased and annual mean precipitation (Rainfall) has decreased, particularly in Assam due To Deforestation . Regional climate models project continued increases in temperature and a reduction in the number of rainy days, although intensity will increase as will total annual precipitation (Rainfall). Such impacts will have a significant effect on tea crop productivity and directly affect the livelihoods of dependent communities.

Broad - scale climate - landscape modeling indicates that tea yields in north-east India are expected to decline by up to 40 per cent by 2050. As yield is directly associated with revenue, changing climate is also likely to impact economic structures of those reliant on tea, particularly the smallholders given their increased vulnerability to changes in the system. Poverty is a major social challenge inAssam and the majority of the rural population is reliant on agriculture for livelihoods . Socioeconomic changes in the tea industry, driven by changes in environment -climatic factors, will have a severe adverse impact on the rural economy.

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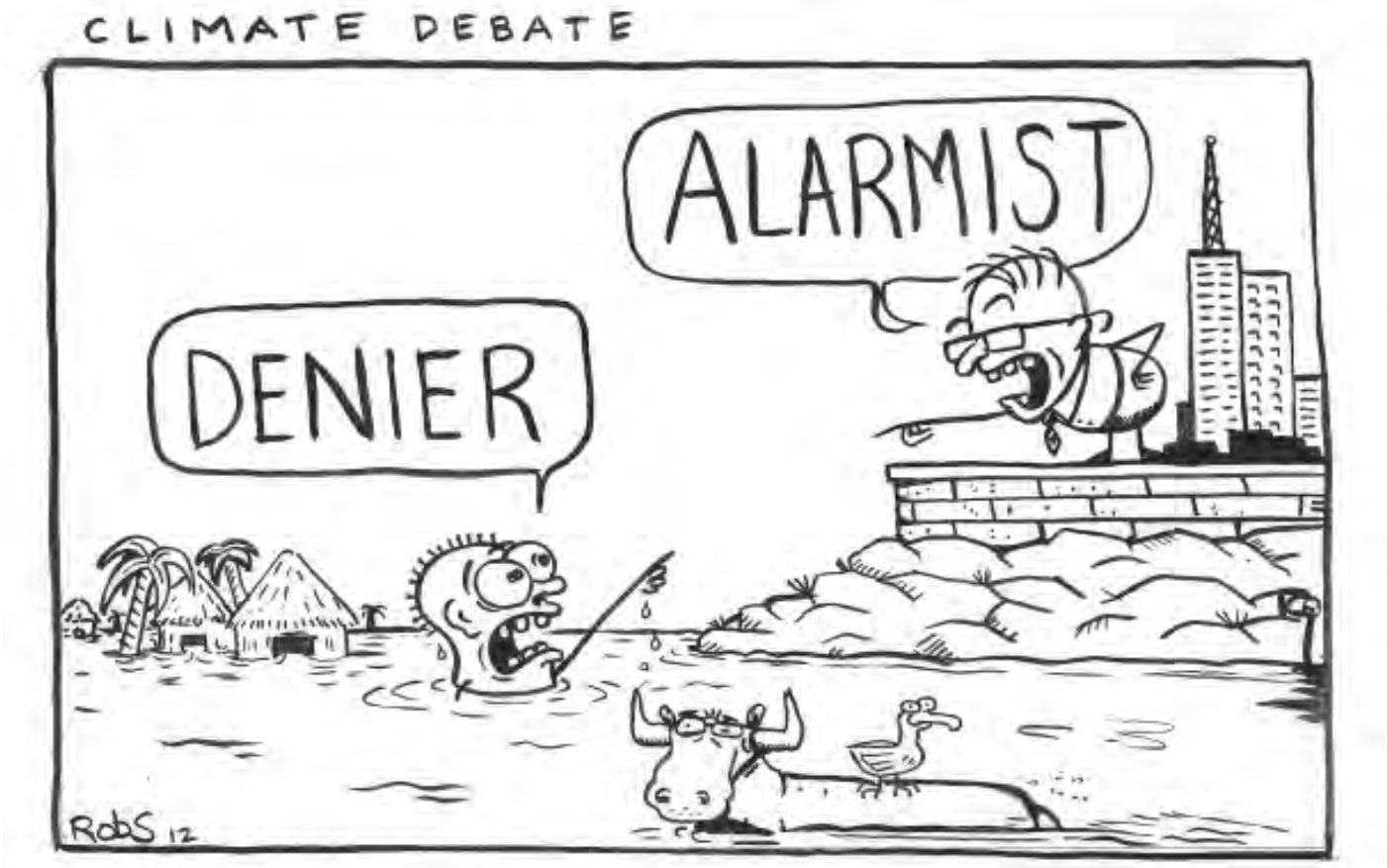
A lesson on Climate Change From China

Is climate change changing the taste of tea in China ? Can producers and consumers perceive such changes? What are implications for farmer livelihoods and benefits we derive from tea as consumers in China ?

Tea is cultivated, processed and prepared in diverse ways in China. This diversity makes tea in China very special to India . China is regarded the motherland and center of genetic diversity of tea with over 1,500 cultivars of the teabush .

Preliminary findings have found that teas functional quality significantly varies with extreme weather events, which are becoming more frequent with climate change. Specifically, compared to an extreme spring drought, tea leaves grown during the monsoon at a study site in South West China were up to 50% higher in terms of growth parameters while concentrations of major compounds that determine tea functional quality were up to 50% lower. This suggests that changes in precipitation may have a dilution effect on tea quality or cause drought or water stress.

A decrease in tea quality is associated with a decrease in tea prices and income derived from tea sales; which substantially impacts upon farmers' livelihoods .These findings



validate farmer perceptions that lower precipitation impacts tea quality.

A lesson For Assam and The North East.

Similarly Growing India's famed Assam tea now costs more and is becoming increasingly challenging because of changing weather, experts have said.They say coping with the changes in temperature and rainfall have meant added expenses to maintain production ,But they cannot raise their tea price because of market competition. Scientists and tea growers in Assam say temperatures in the region have gone up, dry periods are now longer and rainfall patterns are changing.

It's going to be a very difficult situation. We need to take adaptive measures says DrRM Bhagat, TRA –Jorhat (Tea Research Association)

"Earlier, we had evenly spread rainfall," says Mr Manish Bagaria who has a tea estate in Dibrugarh, Assam". Now, what we have been noticing over the decade is we get a lot of rainfall in one particular month or a couple of months and that erodes the topsoil of the tea garden.

"While that already affects our production, the dry spell makes our bushes prone to pests, for which we have to use more pesticides and that means higher costs."

Another tea grower in Jorhat, Assam, Mr Prabhat Bezboruah, has a similar experience.

"There has been a weird resurgence of pests that had been dormant for decades (LooperCaterpillar). Now, with the weather changes and the temperature going up, we are seeing all kinds of pest coming back."

Some tea garden owners say they can deal with pests for now but the more pressing problem is the changing pattern of rainfall.

"Since the dry period is longer and it rains heavily within a short span of time, several large tea gardens have started using irrigation systems to get better yields," says Mr Bagaria. That is a very expensive way of growing this crop."

Experts say Assam's tea gardens once benefitted from the right balance between rainfall and sunlight. Now they worry that balance has been lost.

"The change in precipitation, particularly, will be very critical," says Prof Arup Kumar Sarma of the Indian Institute of Technology Guwahati, who recently carried out research on Assam's tea gardens and climate change.

"Our study shows that this region will be having a longer dry period and the peak flow of the monsoon will also be increasing."That means we will have very extreme rainfall."

Professor Sarma said his team also observed that the monsoon rainfall was shifting and that would affect tea production. "The monsoon already begins a bit late in some places now and that means that due to the prolonged drought, people can pluck tea only in March, while they had been plucking in February for nearly half-a-century.

"Now we get the highest rainfall during June and July but our models are showing that, in the future, the peak period will be in September, so these changes will certainly be affecting the tea gardens."

Mr Bezboruah says changes in rainfall patterns are likely to impact the tea harvest.

"Earlier, we used to have a good harvest in March and April and then in November and December, now we are getting around 65% of our crop in four consecutive months - July through October.

"This means we need to invest in new machines that can handle 17% of output in a month and also we require advanced storage facilities because there is a glut of supply in those four months, fetching us a bad price."

Climate Change and Quality

Climate change is affecting the cultivation of Assam tea, with rising temperatures reducing yields and altering the distinctive flavour of India's most popular drink, researchers say.

High hills and abundant rainfall make the north-eastern state of Assam an ideal place to grow tea, with 850 gardens over 320,000 hectares (593,000 acres) producing the majority of the country's harvest. But in the last 60 years, rainfall has fallen by more than a fifth and minimum temperature has risen by a degree to 19.5C.

The changing taste of Assam tea is a serious concern for growers , subtle changes had already been observed: "The flavour has changed from what it was before. The creamy and strong flavor of Assam Tea is no more."

The tea plucker at work at sagmootea tea estate against the picturesque backdrop of Karbi Anglong Hills ©APPLF

"There is a huge demand for Assam tea abroad, and this is due to its strong, bright flavor. The changes will sharply hamper the demand for this variety of tea abroad."

Conclusion

Over the past century, average land temperatures in Assam have increased by 1.3 °Centigrade and rainfall is down by 20 centimeters, saysDr R. M. Bhagat, chief scientist at the Tea Research Association in Jorhat , Assam .

He says that rainfall used to be evenly distributed, but in the past 30 years has become unpredictable because of an increase in the severity and frequency of extreme weather events. "Sometimes there's too much rainfall, and at other times not enough," he says. Too little rain forces planters to use sprinklers or irrigation pipes to get better yields, but those are expensive.

The change in climate is also conducive to pests such as tea mosquito bugs (Helopeltis) infesting the plants' shoots. The invaders eat foliage and infect the plants with diseases, thus lowering the yield .

The use of pesticides and fertilizers has in turn increased, resulting in an increase in production costs and posing a potential risk to human health.

Experts say these changes have meant that the characteristics Assam tea is famous for – pungency and a full-bodied flavor – have changed. So how are planters dealing with the changing climate?

Scientists in TRA ,Jorhat , Assam are testing types of tea that can adapt and survive in hotter and drier conditions. "We are testing tea varieties in likely future scenarios: under elevated carbon dioxide and elevated temperature conditions using specialized equipment .

The Tea Research Association and the University of Southampton in the UK are also investigating impacts of climate change on tea production and livelihoods in north-east India.

Although this research is ongoing and the group is yet to complete its analysis, principal

Source: csoc.in

investigatorMrsEllie Biggs of the University of Southampton tells that in Assam, rain appears to have a more significant association with tea yield than temperature does. She says preliminary findings suggest that water-resource management could "play the most vital role in climate impacts on tea for this region".

Meanwhile, some tea planters have decided to increase vegetation cover and create more water bodies on vacant land within their plantation areas. It's a simple and cost-effective method.

"We need to micromanage in whatever way we can," says MrSandip Ghosh, secretary of the Assam branch of the Indian Tea Association. "Green plants retain the moisture in the soil. You can't do any damage if you plant trees."

But despite efforts to counteract the effects of the changing climate, some in the industry are fearful that the day might come when Assam may no longer grow high-quality black tea.

A small number of the region's 800 plantations are already moving into producing green tea, for which they can fetch higher prices – leaving traditional black Assam varieties behind.

"Who can fight with nature says Mr Chandan Bora a tea planter from Tingkong Tea Estate of Andrew Yule. The low quality of tea being produced is a real danger for the industry."

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Climate Change: A Major Challenge for Sustaining Crop Production in North Eastern India

The Indian Government report entitled 'National Action Plan on Climate Change' observed a warming trend in the North Eastern India. The report further says that although monsoonal rainfall at the all India level does not show any significant trend, yet regional variations have been recorded. A trend of decreasing rainfall has been recorded in North Eastern India (-6% to -8% of the normal over the last 100 years). Instrument records over the past 130 years do not suggest any marked long term trend in the frequencies of large scale droughts and floods. But in multi-decadal periods, trends of more frequent droughts followed by less severe droughts are observed. There have been overall increasing trend in severe storm incidences along the Indian coast at the rate of 0.011 events per year. Using the records of coastal tide gauges in the North Indian Ocean for more than 40 years, it has been estimated that sea level rise was between 1.06 -1.75 mm per year. These rates are consistent with 1-2 mm per year global sea level rise estimates of IPCC.

The Himalayas possess one of the largest resources of snow and ice. Its glaciers form a source of water for the perennial rivers like Brahmaputra. Glacial melt may impact their long term lean season flows, with adverse impacts on the economy in terms of water availability. The early records from 1900-1920 of rainfall at different places in Assam suggest no perceptible changes in rainfall pattern. Slight changes in rainfall occurred, but somehow not noticed, because there were many other issues like developing Agronomic practices, fertilizer research etc., that became a priority for the scientists rather than climate change during that period. Moreover since population pressure was not high and resource availability was quite good, hence any small climate variability was not given much importance. It was only in the last about two decades that the issue of climate change became important in the North Eastern India, when some variabilities in long term weather data were observed after time series analysis, followed by some observations on crops.

Climate trends in North East India

The archived meteorological data at Tea Research Association's, Jorhat, Assam based Tocklai tea Research Institute for seven met stations in Assam and North Bengal (Fig.1) indicated that in general average rainfall is decreasing over the years with varying magnitude. In general, the rate of decrease in rainfall has increased in the last 30 years.

The rate of change of rainfall calculated for all these sites showed that the rate of decrease was maximum in the South bank and minimum in sites in North Bengal. But since the time period is not the same at all the locations, the earlier years data may influence the rate values, which may also again influence the analysis. Compared to earlier years, recent years have shown more decrease in rainfall. Traditionally Upper Assam (Dikom) used to receive a favourable winter rainfall, but recent years it has shown a shortfall. The weather in North Eastern India during the post monsoon, winter and pre monsoon months

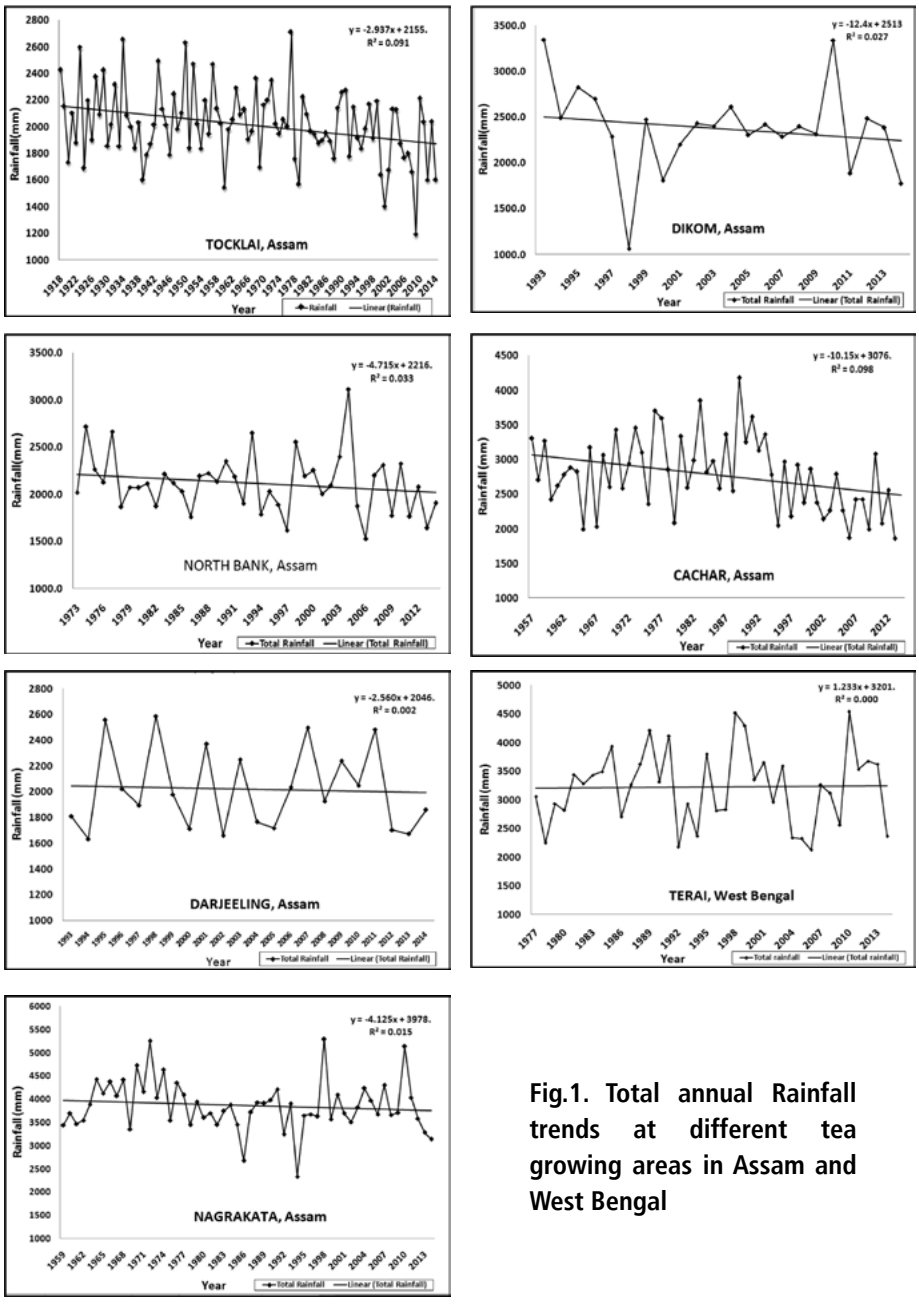

Fig.1. Total annual Rainfall trends at different tea growing areas in Assam and West Bengal

is determined by tropical cyclonic storms and also thunderstorm activity which can be traced indirectly to the western distur¬bances (Anilkumar et al., 2008). These occur with a frequency of up to about seven per month and they can be traced to intense depressions in the Mediterranean and sometimes even in the Atlantic Ocean and their associated secondary depressions in the Red Sea and Persian Gulf areas. Thus role of thermal and wind fields over Arabian Sea on the onset and progress of South West Monsoon can also not be ignored (Krishnakumar et al., 2007). After crossing the Indian frontier, some of these depressions move in a North-Easterly direction to the western Himalayas, while others take a more easterly course and travel as far as Assam and North Myanmar. This may be the probable reason for the favourable rainfall during winter in upper Assam and also the explanation is to be found in the barrier presented by the Himalayas and the hills on the Myanmar border (Gokhale and Dutta, 1960).

The pertinent questions therefore are i) by these arguments should we conclude that the paradigm shifts in rainfall over the years and recent abrasions are because of something happening elsewhere in the globe or ii) should we assume that we are safe as long as some new research does not pinpoint our specific role to combat the impacts of climate change on tea production? Perhaps, without looking much to the answers, efforts must be directed to develop a climate resilient tea production system that is largely practical, economical and sustainable. The temperature regime is also changing. It has been estimated that on an average the temperature has risen by about 1.40C in the last one hundred years. These estimates are based on real time data.

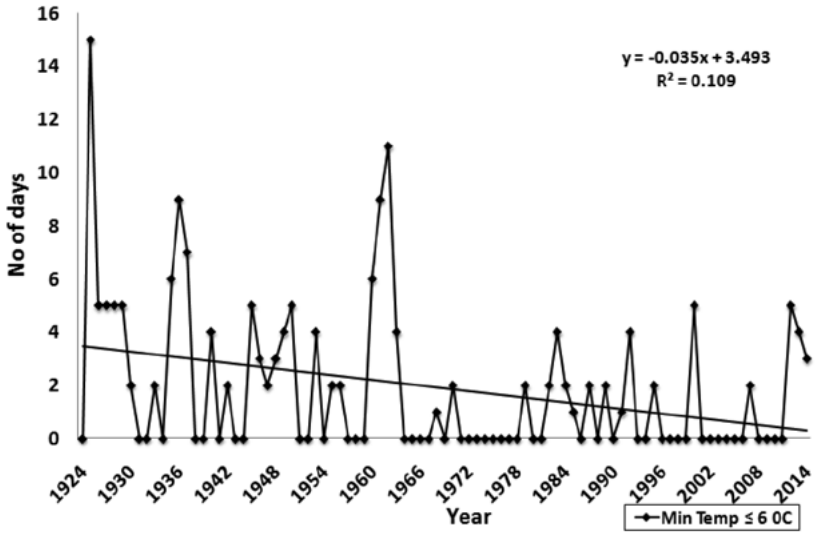

Fig.2. Total Number of days in a year having temperature <60C in Tocklai, Assam

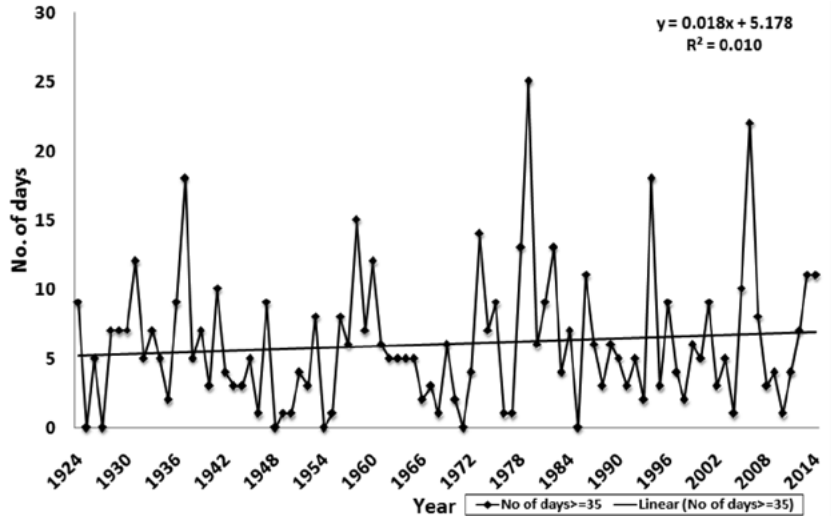

Fig.3. Total Number of days in a year having temperature >=350C in Tocklai, Assam

Long term data indicates that the number of days with temperature less than or equal to 60C have decreased (fig. 2), indicating a warming trend. Not only that the number of days having temperature more than 350C have also risen significantly in the last 30 years (fig.3). While tea scientists claim that tea thrives best in temperature between 13 – 300C (Barua, 1989), some kind of self adaptation is still keeping tea to grow well while temperature soars beyond 350C. Although, it is widely believed that tea has very wide growing amplitude, it is still to be seen how cultivar specific this amplitude is.

Impact on crop yields

Simulation analysis of projected impacts (2030s) of climate change on various crops in the North Eastern India indicates (INCCA 2010) that the climate change may bring change in irrigated rice yields by about -10% to 5%, while the impacts on rainfed rice are likely to be in the range of -35% to 5% in the A1B 2030c climate scenarios in the NE regions. In case of wheat (grown on relatively less land) the yields are projected to reduce by 20%. Potato yields are likely to be marginally benefitted up to 5% in the Upper parts of NE region due to climate change influence, but in the central part the yields are projected to reduce by about 4%, while southern part of NE region, the negative effects will be much higher. Maize crop yields are projected to reduce by 40%. Maize and mustard are likely to experience decrease in productivity in the entire region. Tea, a major crop of the region is grown on over 3.5 lakh ha in North eastern India has also been impacted by changing climate (Fig 4). The yield decline in tea bushes that used to occur after say 40-50 years or more has started occurring in 20-30 years or less. The exact causes of such decline are still

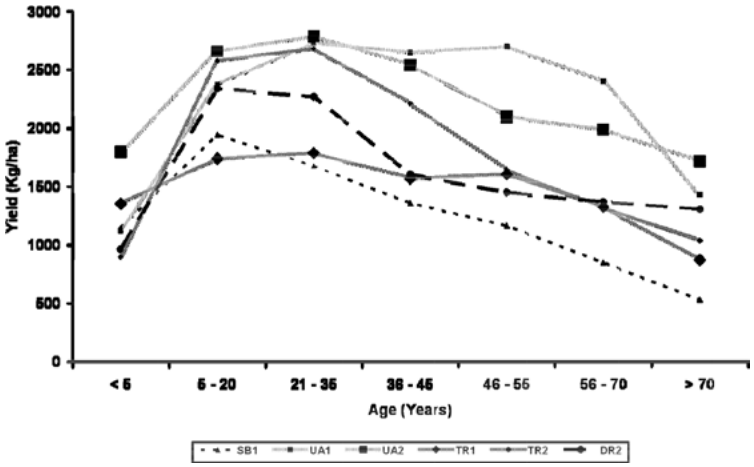

Fig. 4 Tea yield decline (Dutta et al., 2010)

under various investigations, but the major factor appear to be the unfavourable weather prevailing over the years. Abrasive weather triggers both abiotic and biotic stresses. Abiotic stress which mainly includes droughts and floods make conditions conducive for the onset of biotic stresses (increase attack of disease, insects and pest). Although yield is not only a function of climate, but out of multitude of factors climate impacts are maximum on tea yield. In addition, ageing tea bushes may be another factor that contributes to yield decline (Dutta et al., 2010).

Tea quality and climate change

Lot of conflicting reports circulating in the media these days speak of contradictory claims on tea quality. Various tea experts (rather practitioners) also put forth their views on tea quality complicating the issue further. While it is widely assumed that tea quality is declining to some extent because of climate change and the usual phrase is that 'we have lost the Assam character in today's tea'. The reality remains, however, that we have no time series quality data of tea emanating from the same bushes from the same section/gardens over the time. If such data are non-existent then assuming a quality decline due to climate change is perhaps very quick and too early a conclusion. On the other hand, last about more than sixty years, with the advent of first TV series clone and so on, there was a strong emphasis on higher production which later intermittently converged to quality at times. Universally it is accepted that quantity and quality have an inverse relation and it is truer in biological systems. While we have selected the higher producers repeatedly from large populations of Assam types, necessarily these plants were ought to be different in some ways than the other plants (the true Assam types or original Jats) in that population and surely had different characters (departing from Assam quality material). This may seem to be a weak argument to Plant Breeders, but by no means we can assume that these plants were not different from others. And if in the process we left out the true Assam types by compulsion or experimental obligations/ ethics, then original quality is bound to be a causality, which was inherent to those plants (left out in the population). Further, a consistent and increasing amount of chemical injection in soil and plant in the shape of high analysis fertilizers and pesticide have also contributed to quality problems. Hence, are we then correct in blaming climate change for quality decline? This paradoxical situation need an immediate attention, whatsoever answers of individual convenience may be.

Possible adaptation to climate change

Adaptation measures can offset negative impacts of climate change on irrigated wheat and rice, but in the case of rainfed rice, growing of tolerant and high-input efficiency rice varieties with better management and creating assured irrigation can reduce the climate change impacts. For tea also irrigation is becoming inevitable due to long rainless periods and will be required for sustaining tea production. In tea gardens, maintaining proper shade, creating green belts on periphery, closing all ditches (hullas) post monsoon, creating water bodies may lead to more humid conditions in the garden, thus delaying the onset of drought like conditions. Another long term input to combat climate change is to maintain soil organic carbon stocks. Plant residues, organic manures and composts as far as possible should be added to the tea plantations to bring about more climate resilience.

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Combating Climate Change the Subaltern Way : In Conversation with Dunu Roy

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Dunu Roy, Director of the Hazards Centre, New Delhi, is a chemical engineer by training, social scientist by compulsion and a political ecologist by choice. He has worked for over four decades with both rural and urban communities and has been a driving force on projects pertaining to land and water management, secure settlements, safe work, environmental planning, leadership training, pollution control, to name a few. Dunu Roy has precariously positioned himself on the fault line of development and environment.

How did the Hazards Centre come into being?

I think it started with the Bhopal Gas disaster. During that time it came out fairly clearly the communities, groups of affected people, needed some kind of technical/professional support to understand their problems and sort them out. There was a big lack, particularly for the Bhopal case. Almost the entire research and information dissemination was done by Government institutions and they are very tightly controlled. The knowledge that they produced never got to the people. People were left asking a series of questions to which very few people had answers. So that is why this got set up as a 'hazard' centre to respond to people's request. It's a kind of a multidisciplinary group and it's called a 'Hazard' centre because it responds to whatever people consider a problem. By choice it does not have a self-definition of hazard. We respond to whatever problem people will approach us with and around that problem, if necessary, set small research teams to try and understand the problem. There is a lot of participation we invite from the affected people themselves so much of the research is what we call 'participatory research' where they collect the data, try and understand the problem and quantify it. In a way that helps them make sense of not only the problem they are presently facing but also where it is rooted and what can be done to address it. They make the choice themselves as to how address the problem from within a range of options that is available and they'll pick the option that is most suitable, accessible and affordable for them. In that process they may have to lobby for schemes to be implemented, policy to be changed or participate in the governance through which policy is set. We try and provide assistance in all these areas.

Is it then about empowering communities so as to augment their access to processes rather than having others do so on their behalf?

Yes, more or less, except we are very wary of the word 'empowering' because it seems

to mean that somebody else comes and empowers them. Empowerment has to be a self-driven process. Nobody can empower a community. The community has to empower itself. So it's in that process that we try and provide whatever professional and technical assistance that they would require.

An article of yours, 'A Subaltern View of Climate Change' recently got published in the Economic and Political Weekly. How did that come about? Was there anything specific that had occurred on the ground to initiate this research?

We have several areas and community groups that we work with, mostly in urban areas. Also there is some rural work that we do, but it all depends on who approaches us. And while we were, in a sense, discussing about their problems, we found there was a lot of curiosity about climate change and how it was likely to affect them and what they could do about it. First they wanted to understand what it was because they'd heard about it. So from time to time, we do what we call proactive research where if several areas, community organizations are asking for a certain concept to be clarified and we receive several requests for that kind of information, we go ahead put some stuff together and develop a larger conceptual format. For example, we did something similar for the Commonwealth Games or the concept of Smart Cities which is coming in now. There's a fair amount of interest in them but nobody seems to know what a Smart City is.

So that's how this research and article on climate change came about wherein we have, if you recall towards the end of the article, we are trying to weave in what different groups are doing in different parts of the country and how that is related to the conceptual framework itself.

Could you tell us a little bit about the two approaches to climate change that you talk about in your article?

See, the argument goes as follows: development has taken place and if you look at the developed nations, they have followed a particular energy path to get at that development. 'Development' is broadly defined as economic development, with more and more consumption. This is the parameter for development. So, for instance, if you're consuming larger number of cars per thousand, you're considered to be more developed than those who are using fewer cars. So the development path has followed a high energy trajectory and essentially the argument seems to be that you want to arrive at the same development goals but follow a lower energy path and how that can be achieved. This is why much of the debate on climate change globally is focussed around what kind of new technologies, materials, and resources can be used to follow a lower energy path. So, to put it very simply, instead of a petrol guzzling car, would it be possible to have a car which consumes very little fuel and whether that fuel can come from renewable resources. This is the broad framework within which the global debate on climate change is presently located. It is a very technocratic understanding of climate change.

There is another understanding, which is more a range rather than a single understanding. These may at times question whether or not one needs certain commodities which

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use energy; it may question whether the 'development' goal itself is a valid goal; and at times, it may further question the relationship of the human race with nature. There are different levels to this debate but if there is one common thread running through them, it is more in terms of learning to live within particular means which do not require high energy usage; and then examining whether that way of life fits into the natural boundaries set by climate change.

These are the two broad approaches to climate change. The second approach does not get much attention within the global debate on climate change but there are some people who are making a conscious choice to opt for a low energy-consumption lifestyle, such as people like Aparajita Sengupta, the interview from the last issue, who left America in pursuit of a 'low tech' life. However, there is a certain amount of technology implicit in that as well. Even if you are involved in organic farming and trying to live in consonance with nature, what are the technologies used for that organic farming? There may be a question here regarding the goal of that farming. Is it for producing large amounts of cash crops to enter in to the market or is it for producing adequate amount of food crops for distribution amongst the local population? So, the goals could vary. But, at the least, this debate needs to be thrown open. The reason we produced that article on climate change was essentially to show that within the lifestyle thread of the debate, there are certain numbers that need to be addressed. If we're saying 2 degrees centigrade, then what exactly is the carbon emission that will fall within that 2 degrees centigrade range? Therefore, we need to assess the amount of fossil fuels we can use and the limits that need to be set for that usage. Subsequently, what is the range within which our lifestyles need to be accommodated? While doing so, we need to look at actual practice rather than an imaginary 'best practice'; and foreground the fact that there are already people who are living that kind of lifestyle which falls safely within that threshold level. We need to be cognizant of what it is that we can learn from these lifestyles. So again, it becomes a question of looking at 'best practice' not in the future but as it obtains right now.

Could you say something about the idea of 'scarcity' and its overemphasis in the global discourse on climate change, where it has acquired a somewhat universal definition, notwithstanding varying contexts? For instance, when we talk about water, the idea that there needs to be flowing water for consumption, whether we are talking about a water-abundant part of the world or a dry, arid region, scarcity of water will be quantified in the same terms, thereby, delegitimizing the traditional lifestyles of communities who were otherwise well-adjusted to the specific ecosystem of the landscape. Would you have some thoughts to share on this?

Well, there are three parts to your question. One is, within a given ecosystem, what kind of lifestyle, which includes production and consumption, should one follow? And, quite clearly there are two options there. One is to say we will change the lifestyle to live within the ecosystem, in other words, adjust

the lifestyle. The other is to say no, we will change the ecosystem in order to pursue a particular lifestyle. This is the larger debate. But implicit within that larger debate is the second part of your question of what is this notional 'lifestyle' that ought to be pursued. This is what comes in the way of the debate around desire and aspirations.

Very often people, intellectuals, who have already accepted a particular development pattern, will ascribe the same aspiration to everybody. They will say that everybody needs a car or that if you ask everybody, they will all want cars. Equally, they will say everybody wants to have a shower. This is an imposition of aspiration on whole masses of people without ever asking those people what is it that they want and what is their aspiration. And, if one does ask these masses of people what their aspirations are, curiously enough we find that their aspirations are often not contemporary but generational. At least, they will not say 'I must have a two storeyed house with electricity, water and everything'. They will by and large say, for instance, that if they presently have a 20 sq yards plot of land that maybe a 30 sq yards plot of land would be adequate for their purposes. So, that is the extent of their contemporary aspiration; it does not go beyond that. But the generational one will be essentially that their children should not have to live the way they did. That does not put a number on things. That does not say that their children will require more than 40 buckets of water but it does say that at least they should not have to survive on one bucket. That answers, I think, the second part of your question.

And the third part of your question, is about scarcity itself and I look at it this way, India currently is well under the global average of energy consumption. It is also under the limit set by the carbon footprint threshold and this is largely because 80% of India's population is living a very frugal lifestyle. But if I say the average Indian is still under-consuming that means that there is space for the average Indian to consume a little more. And, it is in that respect that scarcity becomes important, as to how much more would the average Indian require for consumption. For instance, if we are talking about water, the average Indian in the city will be consuming 30 litres per person per day, which is a huge range actually. It can vary from 500 litres for the rich to 10 litres for the poor, but the average is around 30 litres. We have done some studies that look at aspirations where we ask households getting a certain amount of water, how much more they would require in order to have adequate quantities to meet their daily needs. The average works out to about 110 litres, even in a city like Delhi. In smaller cities like Benaras and Udaipur, it would amount to 80 litres per capita per day. So what we are saying is that consumption from 30 litres goes up to 80 litres, or maybe becomes two/three times more but not more than that. And then the question really becomes is there that much water available? If there isn't, then we have to bring that aspiration down and if there is, then the aspirations can be met. And if you look at national availability of resources, basic resources such as land, water, food, electricity and so on, one finds that, if we take that aspirational value of

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communities where they want a better life for the next generation, the amount required is well below the average available. And it's really a matter of distribution. It's absolutely not a matter of production. We are producing enough; we are just not distributing it right. And that is where the rich can actually afford to have that development lifestyle which they treasure and believe everyone else aspires to, which is to my mind not true. And the data is very clearly beginning to show that such an aspiration does not exist and if you therefore, pitch it at what people say they need and then examine the availability of resources then in reality, there is no scarcity.

And again, to that I would add, because you asked about ecosystems, that this average figure should be treated as just that – an average figure. It is not a figure that should obtain in practice because different ecosystems will demand different per capita availability.

That countries are now able to trade carbon credits, whereby the onus of 'green development' would largely rest on the developing world, who are already struggling to reach that benchmark of having 'made it', while the developed countries can continue to retain their high-level consumption patterns, primarily due to the availability of greater financial resources at their disposal to purchase carbon credit, appears to be a flawed model to begin with. What are your thoughts on this?

See, it's largely a matter of how you interpret 'sustainability'. When the developed countries talk about sustainability, what they actually mean is a technological model that will sustain the development path that they are already on. That is their notion of sustainability. What is needed in order to sustain nature does not figure in their scheme and it is more a notion of sustaining 'development' or rather, what development has come to mean. But within that logic itself, there is a contradiction which needs to be levelled. If the more developed are saying that they can purchase carbon credits from the less developed and in exchange for money that will aid their development process, then actually it recognises the fact that there are people in the world who are sustaining themselves at a lesser level of consumption. And, if the lifestyle in the developing world is implicitly recognised as 'greener' than what the developed nations are pursuing, then that greener lifestyle should become the model and not the other way round. So, I think that is how the whole debate needs to be leveraged, where these people, who are considered to be the least developed but at the same time, do not have a large carbon footprint, should in fact, show us the way as to how to sustain within nature.

But acknowledging this would be a problem as it would entail changing consumption patterns and it would mean rethinking what it means to be 'developed'?

Certainly! This is why there are these two poles of the debate. One is talking about a technocratic model, where 'development' is a given and all we have to do is tinker around with the technology in order to ensure a lower energy path. The opposition to that debate says no, you can't even follow that lower energy path if you are aiming for sustainability and that a total reconfiguration must take place where we need to change lifestyles.

Coming back to the article and your research on climate change, have you taken back your findings to the communities that had raised the initial queries? What has been their reaction to it?

Yes, we have started going back to the communities and they find it interesting. One of the things that they have come back to us with, which in my opinion opens up the debate further, is that they have pointed out that the figures we are giving, and these are national figures, only pertain to consumption, that is, how much energy is being consumed – how much fossil fuel is being consumed and how much carbon dioxide is being released. They have contended that we need to incorporate the production debate into this as well because the work that they do may be fixing carbon back. A good example of this would be waste-pickers who take organic waste out of landfills and convert it into compost. That is very much carbon fixing. Gardening is carbon fixing. These are all urban occupations at the moment. Childrearing and cooking, these are all carbon fixing in some senses because they are trying to retain the carbon in the living organism. So, in a sense their production-oriented activities balances out their carbon footprint and their question was how this is being computed. We have just undertaken a series of studies on that aspect to comprehend and quantify the carbon fixing that people are doing in their various occupations and over the course of their daily lives. Only then can we work out the total emission in carbon dioxide

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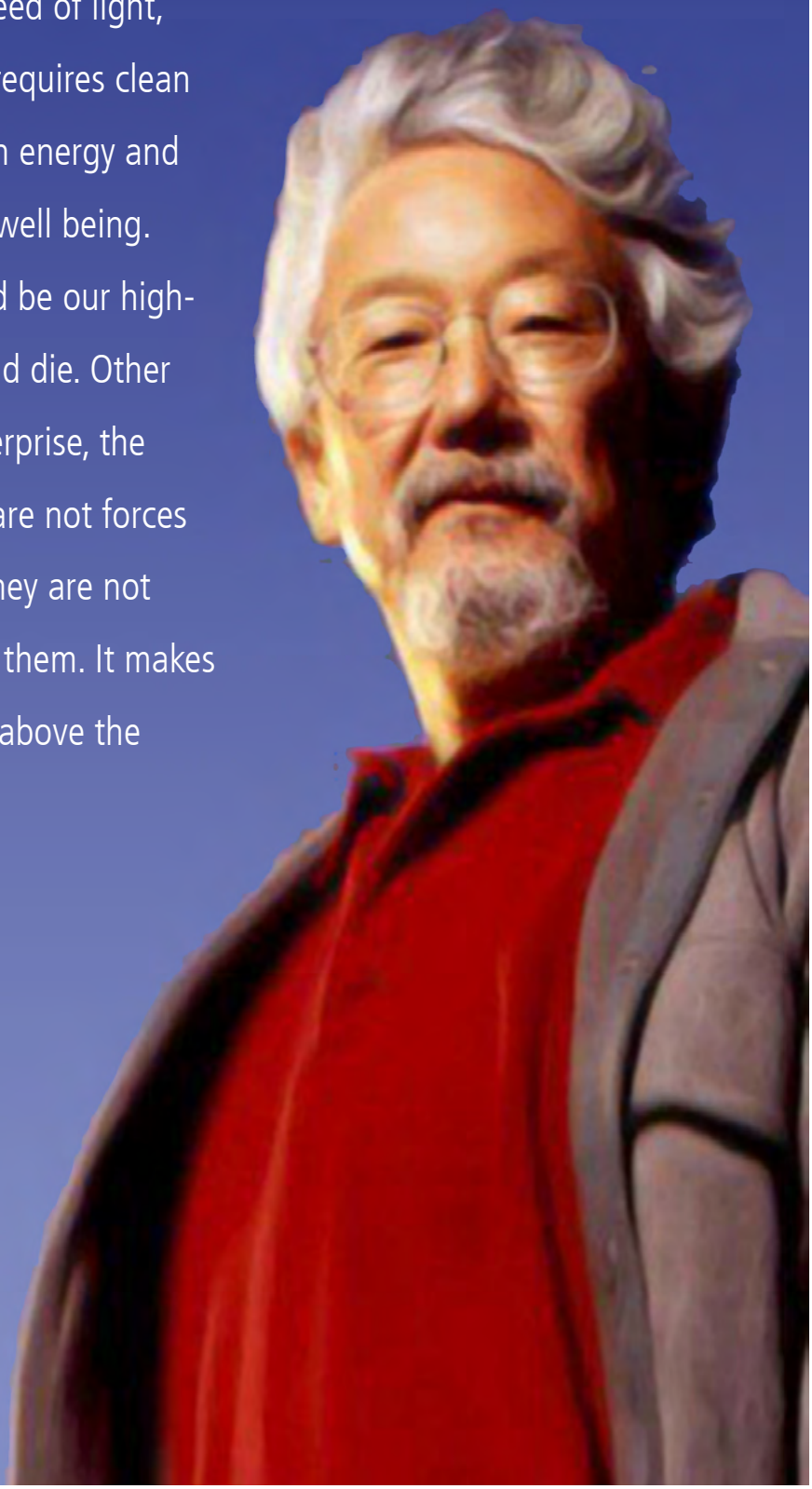
DAVID SUZUKI

There are some things in the world we can't change-gravity, entropy, the speed of light, and our biological nature that requires clean air, clean water, clean soil, clean energy and biodiversity for our health and well being. Protecting the biosphere should be our highest priority or else we sicken and die. Other things, like capitalism, free enterprise, the economy, currency the makert are not forces of nature, we invented them. They are not immutable and we can change them. It makes no sense to elevate economics above the biosphere.



Organic News

World Scenario

1. **Organic farming continues to rise across the globe**

http://www.csmonitor.com/World/Progress-Watch/2015/0217/Organic-farming-continues-to-rise-across-the-globe

- 2 million of the world's 1.5 billion farmers are now producing organically, with nearly 80 percent based in developing countries.
- India boasts the most certified organic producers, followed by Uganda and Mexico.
- Currently 164 nations have certified organic farms, powering an industry worth $63.9 billion.

2. **Govt incentivizes growth of organic farming sector**

http://www.arabnews.com/saudi-arabia/news/707026?quicktabs_stat2=0

- Khalid M. Al-Fuhaid, deputy minister of agriculture, third right, cuts the ribbon at the opening of Agriculture Festival at Khuraish Road Lulu Hypermarket in Riyadh
- Saudi Arabia has expressed its support to farmers in promoting organic farming, and to phase out production of all water intensive crops that are depleting the country's scarce water supplies.
- The total number of organic farms in the Kingdom exceeds 130 today.

3. **Demand for organic milk causes shortage**

http://www.mnn.com/food/beverages/blogs/demand-for-organic-milk-causes-shortage

- It may cost twice as much as conventional milk, but demand for organic milk keeps rising.
- In 2014, sales of organic milk rose 9.5 percent, Bloomberg reports. Consumers paid 8.4 percent more for that milk than they did the year before.
- People are buying so much organic milk now that some stores are seeing a shortage. Wisconsin, a state that produces a lot of milk, had a 10-day shortage last month.

4. **New crop production guide aimed at helping farmers tap organic markets**

http://www.farmanddairy.com/news/new-crop-production-guide-aimed-helping-farmers-tap-organic-markets/243946.html

- If you are an organic crop producer in the Northeast, or a farmer interested in transitioning to organic, there is a new resource available to help provide the research-based information you need to be successful.

5. **Wal-Mart searching for footing in organics**

http://www.foodbusinessnews.net/articles/news_home/Business_News/2015/03/Wal-Mart_searching_for_footing.aspx?ID=%7B7CB6C080-A180-447A-8767-2D9F1FA4CC52%7D&cck=1

- Organic was not the only aspect of Wal-Mart's food business addressed at the conference. Mr. Holley stressed the company must run "a great fresh area" if it hopes to be successful in food. He said the company needs to do a better job in its deli, bakery and meat areas.
- "I think we've upgraded some of those (areas), but I think they have a longer way to go," he said. "We need to not just satisfy customer need, we should be exceeding some of those."

Indian Scenario

1. **Farmers launch organic farming initiative**

http://timesofindia.indiatimes.com/city/kochi/Farmers-launch-organic-farming-initiative/articleshow/46570179.cms

- A group of farmers in Kerala has launched 'Organic Farming Research Programme' to help propagate successful organic farming techniques among others.
- Figures from International Competence Centre for Organic Agriculture (ICCOA) show that the f organic products business in India will touch Rs 6,000 crore towards the end of 2015.

2. **Fabindia plans to sell organic produce online**

http://timesofindia.indiatimes.com/business/india-business/Fabindia-plans-to-sell-organic-produce-online/articleshow/46657582.cms

- You may soon be able to buy organic fruits and vegetables at the price of regular produce or even less.
- A study commissioned by Fabindia shows that by the time some items such as chilies and cauliflowers arrive at markets in Delhi, their prices go up by around 100% or more.
- Plans are afoot to establish a supply chain that can deliver fresh produce directly from farmers to households by cutting off middlemen.

3. **Adopt organic farming: Haryana Governor**

http://zeenews.india.com/news/haryana/adopt-organic-farming-haryana-governor_1568375.html

- Haryana Governor Kaptan Singh Solanki on Thursday called upon farmers of the state to adopt organic farming, saying excessive use of fertilisers and insecticides are affecting the health of people and land fertility.
- The government is implementing a number of schemes to promote organic farming in the state

Organic News

4. **Punjab to set up organic farming board: Badal**

http://www.thehindubusinessline.com/industry-and-economy/agri-biz/punjabto-set-up-organic-farming-board-badal/article6959169.ece

- Punjab Chief Minister Parkash Singh Badal has said that an organic farming board will be set up in his State to aid and promote chemical-free agricultural practices in the State.
- "We were number one in feeding the country, and we will make Punjab number one in organic farming in India, said Badal.

5. **Why organic farming has not caught up yet in India**

http://www.thehindubusinessline.com/markets/commodities/why-organic-farming-has-not-caught-up-yet-in-india/article6933518.ece

- The growth of organic agriculture in India has been accomplished by three categories of farmers.
- The first category is from no input or low input use zones, practising it as a tradition or by default with no organic certification such as the tribes of north-east region. The second and third groups are certified and non-certified farmers, who have recently adopted organic farming realising the ill-effects of modern agriculture and benefits under organic cultivation.
- Farmers don't get premium for their produce in the initial stages during transition to this agriculture

6. **Organic produce sells like hot cakes**

http://www.thehindu.com/news/cities/Thiruvananthapuram/organic-produce-sells-like-hot-cakes/article6944063.ece

- Event a prelude to launch of an organic market at Nanniyode
- The market had over 50 farm produce on display, including 'pulinji' 'mullaathi,' 'agasthyacheera,' green pepper, 'kaverivaazha' — fare the city residents are not very familiar with.
- There was a wide array of tubers, honey, fruits, and other organic farm products. "The produce was sold out within hours," the organisers said.

North-East Scenario

1. **Prime Minister Narendra Modi promises to develop Northeast into organic hub**

http://timesofindia.indiatimes.com/india/Prime-Minister-Narendra-Modi-promises-to-develop-Northeast-into-organic-hub/articleshow/46311314.cms

- With the government's thrust on development of Northeast, Prime Minister Narendra Modi today said the Centre was planning to make the region an organic hub to boost agriculture production and horticulture production keeping in view its conducive agro-climatic condition and has proposed establishment of six new agriculture universities in the region.

2. **International agriculture fair held to promote organic farming in the Northeast**

http://www.ibtimes.co.in/international-agriculture-fair-held-to-promote-organic-farming-in-the-northeast-35529

- The second edition of 'Assam-International Agri-Horticultural' show in Guwahati was an indication of continuous effort to promote modern farming techniques and organic farming in the state.
- With a participation of 425 stalls from 12 countries and 25 multinational companies, the fair provided an opportunity to state farmers to gain knowledge of global farm technology.

3. **CM for technology to boost organic farming**

http://www.assamtribune.com/scripts/detailsnew.asp?id=feb1115/city050

- Chief Minister Tarun Gogoi today advocated extensive use of science and modern technology for promoting organic farming in the state which will extend from pothar (field) to pak ghar (kitchen).
- He also advocated for smart agriculture which will be a right mix of soil management, seed management, ground water management and technology management to enhance agricultural production.

4. **200 pc fund hike for NE organic farming**

http://www.assamtribune.com/scripts/detailsnew.asp?id=mar0115/at051

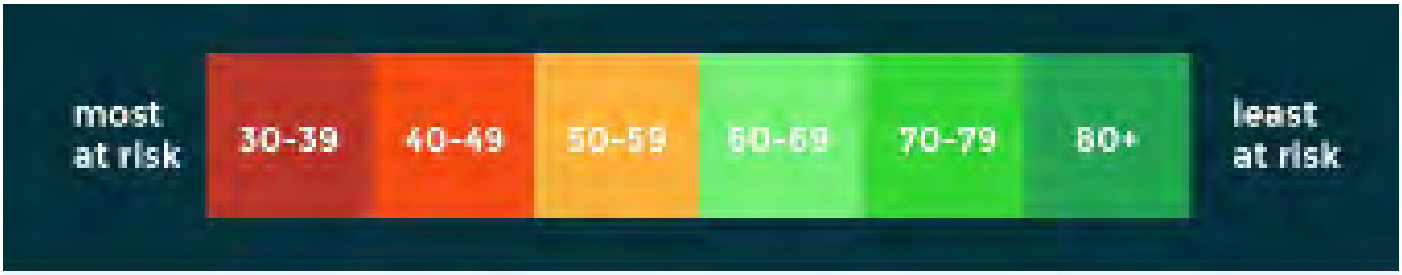
- While, presenting his Budget, Jaitley declared that the hike for organic farming in the North-east, allocation for which has been hiked to Rs 125 crore from Rs 33 crore, marking a nearly 200 per cent hike.
- Prime Minister Narendra Modi had on Thursday said that the North-east has the potential of becoming the organic capital of the country.

5. **Meghalaya withdraws subsidy on fertilisers**

http://www.assamtribune.com/scripts/detailsnew.asp?id=feb1815/oth052

- With an eye on brand-building and market Meghalaya as an organic food producing State, the State government has withdrawn the chemical fertilizer subsidy to farmers

Countries Most Likely to Survive Climate Change



Source: businessinsider.in

BALIPARA FOUNDATION

Assam • India

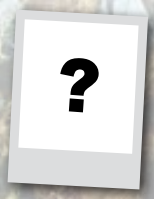
AWARDS 2015 - 6th November 2015, Guwahati, Assam.

'Keeping up with the inherent spirit of wildlife conservation through NaturenomicsTM and scouting alternative strategies for wildlife conservation. We at Balipara Foundation would like to once again acknowledge and highlight the inspirational conservation work in the Eastern Himalayan Region of India.

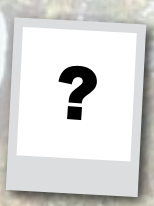
This year the canvas for these awards spreads from bringing out the inspirational conservation work in the Eastern Himalayan Region of India, ranging from the protection of endangered species and threatened habitat to the promotion of environmental education and the development of community driven conservation.

These awards would like to act as a channel which will bring out, celebrate the success of grass root environmentalist. We through these awards make a humble effort to act as a catalyst in bringing out such initiatives which are both people and wildlife sensitive to the larger audience'.

The Balipara Foundation invites nominations and entries for the Balipara Foundation Awards 2015, which should be sent no later than September 30, 2015. Please download nomination form: http://baliparafoundation.com/BFAwardsNomination2015.php and email them to sanjiddutta@baliparafoundation.com/sanjiddutta@gmail.com/robineastment@baliparafoundation.com



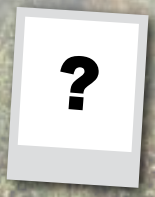
1. The Annual Balipara Foundation Award: This is a nominated award, which will be presented by the Balipara Foundation Board to a government or non-government organization, whose contribution to the protection of wild nature has gone beyond the call of duty and which has displayed demonstrable success in the arena of nature conservation.



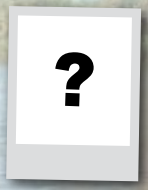
2. The Balipara Foundation Naturenomics Award: The current model of economic development forces us to make a choice between development & sustaining natural resources. Contrary to this belief, Naturenomics believes that this need not be a choice, but the only choice to have economic development alongwith sustaining our natural resources. This award will be presented to a green entrepreneur whose financial and ecological success has proven to be sustainable in wealth formation through the securitization of natural assets such as food, water, energy and environment.

3. The Balipara Foundation Green Legal Award: We are in search of a lawyer or an organization that has used the courts to win justice for wildlife or for communities living in or around ecologically fragile wildernesses.

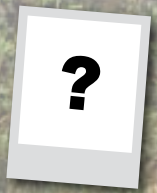
4. The Balipara Foundation Eastern - Himalayan Conservation Award: We are in search of an individual, community or organization that has significantly and successfully worked to protect the wildlife or wildernesses of the Eastern Himalaya upon which millions of people depend for their sustenance.



5. The Balipara Foundation Green Guru Award: We are in search of a green teacher whose purpose in life is to inspire young people to respect, learn about and protect nature. The individual should have leadership qualities, including missionary zeal, passion and dedication so that others may seek to emulate his or her example.

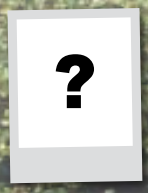


6. Balipara Found ation Wildlife Conservation Award: We are in search of a young boy or girl in the age group 15 to 25 whose life has been dedicated to the protection of nature. The individuals we seek are agents of change and thought leaders of tomorrow and may be students, researchers, employees, or villagers.



7. The Balipara Foundation Food for the Future Award: We are in search of a visionary individual, who might be a scientist, NGO, villager or entrepreneur who has made a significant contribution to the promotion of organic food, or has demonstrated alternative farming methods that increase yields using ecological principles that have brought about replicable change.

8. The Balipara Foundation Nature Conservancy Award: We are in search of a community or organisation, government or non-governmental that has restored a parcel of non-forest land or deforested land to protected, biodiversity-rich forest status for posterity.



9. The Balipara Foundation Lifetime Service Award: We are looking for an individual whose life has been devoted to the ecological welfare of the people of the Eastern Himalayas and whose philosophy and purpose have been guided by the need to protect, restore and care of nature. We are in search of a true hero; an Indian woman or man who is an inspiration to all.

10. Special Award: Forest Guard Award: This award will be presented to forest staff of Forest Departments for their exemplary service towards the protection of Fauna and Flora in National parks and reserve forest of the Eastern Himalayas.

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For more details Visit: www.baliparafoundation.com/ www.facebook.com/baliparafoundation

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