

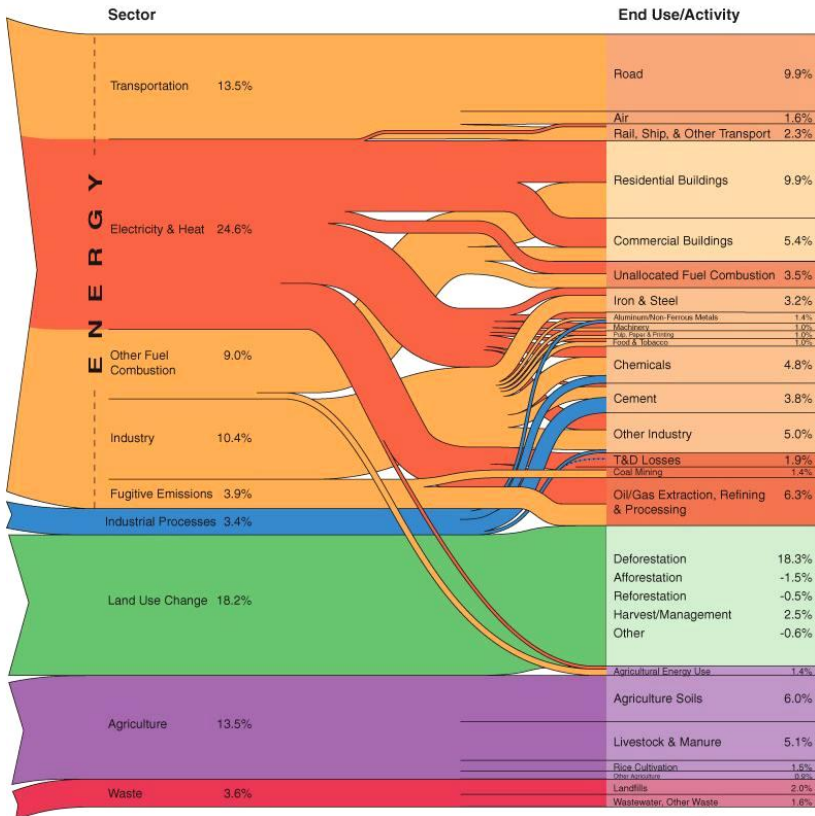


Timbaktu School Children going Organic!

# V The Way Forward

It is human activity - particularly the burning of fossil fuels – that has made the blanket of greenhouse gases around the earth "thicker". In order to do anything we first need to understand the relative contribution of different sectors. In this chart, we see the relative contributions of different sectors and sub-sectors to GHG emissions in the year 2000. It also correlates each sub-sector to the end use activity on the right side.

### World GHG Emissions Flow Chart



Indicative flow chart of relative GHG emissions by World Resource Institute

The sector contributing the maximum emissions 64 %, is the energy sector, with Transportation contributing 13.5 percent, of which transportation of food/agriculture itself is about 9.9%.

Electricity & Heat (24.6 %)

Residential buildings 9.9%

Commercial building 5.4%

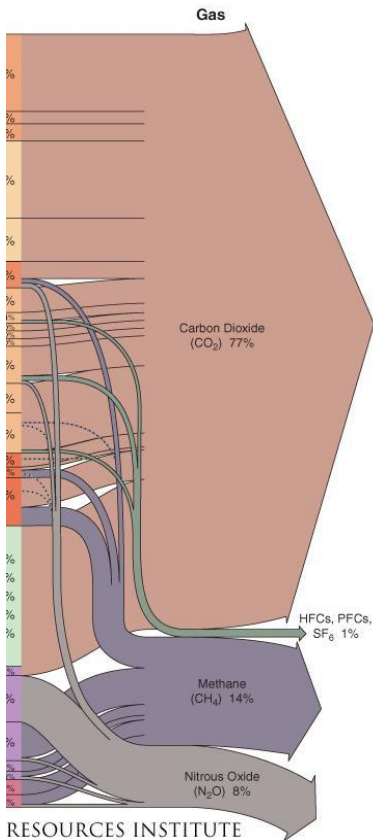
Industry 10.4%

Land Use Change: is 18.2% out of which

Deforestation is the biggest culprit - 18.3 %.

Agriculture contributes 15%. And the bulk of it is

methane emission 9% and nitrous oxide a little over six percent.



The Earth Policy Institute has estimated that the following measures would cut global net CO<sub>2</sub> emissions 80% by 2020”

- a) Raise the energy efficiency of buildings & appliances, through better insulation, efficient lighting, and nano-technology controls for appliances.
- b) Substitute fossil fuels by with renewable: Wind, Solar, Geothermal , Bio-mass and small scale Hydro, Tidal and Wave Power projects.
- c) Improve manufacturing efficiency for carbon emissions heavyweights (chemicals, petrochemicals, steel, and cement) offers major opportunities to curb energy demand)
- d) Restructuring transport to emphasize rail, light rail, and bus rapid transit.
- e) Ending net deforestation and planting trees to sequester carbon

What is to be done!

All these measures rely for their success on the generation of a new economy around energy efficient products, grid connected power generation from renewable source, like wind farms, solar farms, charging points and systems including batteries for plug in hybrid electric vehicles etc. If there is a free market, such a new economy will not work unless fossil fuels are disincentivised through a tax on carbon emissions. The suggestion is to raise tax on carbon emissions by \$20 per ton each year, so that the tax will exceed \$200 per ton of carbon by 2020.

## Climate Change and Equity

The developed countries are reluctant to take such emission based taxation steps, as the proceeds from such a tax would legitimately belong to the commons, and that too a commons which knows no state borders. Even if it were to be used for developing new technology, it would be common property.

For obvious reasons the developed countries want to start from current status of emissions, and legislate a percentage reduction from there, as that would maintain its relative position of economic strength. For example, the US energy secretary has argued for a tariff on imports from countries, like India who did not have mandatory cuts prescribed in the Kyoto Protocol. They say that such measures were necessary to “level the playing field”, especially given the then recession conditions. French President Sarkozy favours a carbon tax on imports from nations that have lower environmental standards than France. China counters this by emphasizing consumption, and says that its emissions because of exports should be the responsibility of the receiving country. Thus the arguments are all based on the need to preserve the economic dominance of the developed countries rather than an equitable sharing of sharing emission responsibility.

A similar divide operates inside each country. For example in India, the top 50 million people (which is the population of many European

Hardy Options

countries, like France, UK, Italy) have emissions on par with the European average.

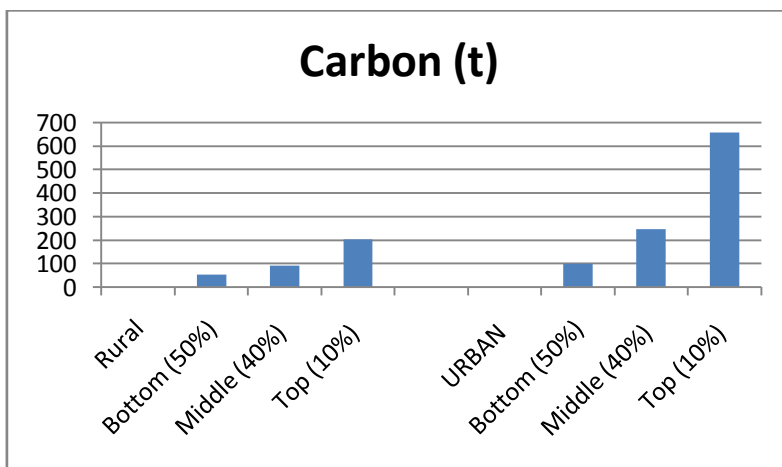
Table 1 shows the distribution of direct and indirect consumption of coal, oil and electricity by different rural and urban income groups and their corresponding carbon emissions.

Table. 1 Per capita Annual Energy Use (Direct and Indirect) 1989-90\*

Income Group	Coal (kg)	Oil (kg)	Elec (kWh)	Carbon (t)
<i>RURAL</i>				
Bottom (50%)	74	22.5	95	054
Middle (40%)	127	39.7	152	093
Top (10%)	262	89.8	284	204
<i>URBAN</i>				
Bottom (50%)	130	45.6	164	101
Middle (40%)	302	118.6	366	246
Top (10%)	765	332.3	858	656
Extreme Disparity Ratio <sup>@</sup>	10.3	14.8	9.0	12.0

\*Excluding energy used directly and indirectly to make deliveries to others demand for private consumption

@ EDR= Urban top/ Rural bottom



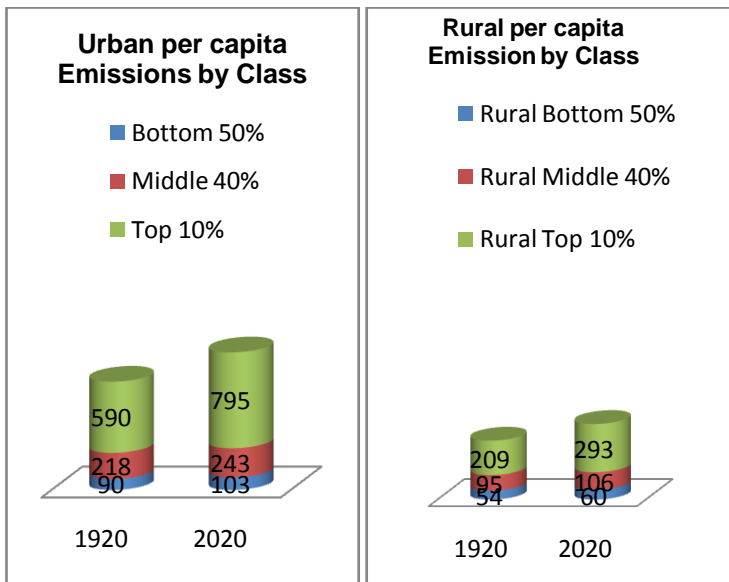
What is to be done!

It can be seen that the bottom 50% of rural people emitted in 1990 a mere 54 kg of carbon per person per year. The richest 10% of urban people emitted 12 times as much at 656 kgC per person per year, which is still way below the world average of 1.1 t and much below the average emission in developed countries.

This is not surprising if one sees Table 2, which shows that the per capita expenditure of even the urban top 10% income group is about \$1000 in 1990.

Even the projected emission for 2020 show, Table 2, that the bottom 50% of rural population would emit a mere 60 kgC per person per year and the top 10% in urban areas 795 kgC. Their projections assume an annual growth rate of per capita real income of 3.5 %.

Table 2. Per capita expenditure and carbon emissions by income classes in India



Income classes	Emission intensity	Per capita expenditure		Per capita emissions		
		1920	2020	1920	2020	
<i>RURAL</i>						
Bottom50%	30.6	1764	1964	54	60	
Middle 40%	30.3	3168	3503	95	106	
Top 10%	31.4	6688	9345	209	293	
<i>URBAN</i>						
Bottom50%	33.2	2739	3122	90	103	
Middle 40%	35.2	6226	6922	218	243	
Top 10%	36.3	16273	21901	590	795	

Emission intensity--Kg of carbon per Rs. 1000 expenditure (at 1990 prices).  
Expenditure in Rupees at 1990 prices.  
Emission in kg of carbon.

The figures in table 2 include Direct and indirect carbon emissions due to private consumption of respective classes. Per capita emissions due to other classes of final demand like government consumption and investment is not included. 1US\$ -Rupees 17 in 1990 (Sources: Murthy et al. (1997a) and Murthy et al. (1997b))

In addition to this inequity, the first half of India lives very highly polluting lives, and does not seem to be taking any responsibility to reduce its emissions. While only 55 percent of Indian households have access to electricity, annual per capita electricity consumption is increasing every year. Obsolete technologies, air-conditioning and other forms of power consumption, compounded by poor building design, have led to over consumption of electricity, often generated in highly polluting ways. Except for a few green workplaces, office spaces are among the most culpable. Malls are also huge consumers of, usually, 'dirty' electricity.

India's growing transport sector, which relies on fossil fuels, is also a key contributor to carbon dioxide emissions. The number of motor vehicles is growing due to opening up of the country's economy that led to a spurt in private car owners.

At the same time, there is nothing explicitly stated in the National Policy, the NAPCC or any development plans that this consumption has to be reduced to sustainable levels, or that they should be carbon taxed appropriately.

What is to be done!

There is nothing in the policy which would give a comparative advantage on the supply side to development of those production systems which have been outside of the fossil fuel or main stream economy. The emphasis seems to be on some notions of energy efficiency, all of which work only on a higher scale, where there would be a higher absolute consumption of fossil fuel, and therefore a higher net emission. The fact remains that the vast, huge majority of people is totally out of the fossil fuel economy, and the efforts to develop these economies in the low carbon path is more or less absent..

### **Low Carbon Development Path**

LCDP is a part of sustainable development. It

- (i) restrains energy demand growth,
- (ii) drives production towards low carbon sources,
- (iii) promotes an economic growth which works with secure energy
- (iv) Uses low carbon and renewable substitutes to fossil fuels

The real fact is that the development activities as well as plans, while aiming to increase growth and therefore emissions, are actually further marginalising the poor and whatever livelihood they may have had.

Most of the rural people in arid and semi-arid regions consume very little energy, particularly those which have a larger carbon footprint. But a majority of these people need to increase their energy consumption if they have to get out of the vicious cycle of poverty/survival. While it is unfair to ask poor people to do something about the CO<sub>2</sub> emissions, the dominant choices of development seem to be forcing them into higher emission development pathways. This is particularly true in the areas of land use change and agriculture. In the name of development, land is being de-forested given to mining, and development projects. In agriculture too many of the technologies increase their carbon footprint. What is more tragic is that more and more people are



loosing control of their livelihood, as these high carbon development pathways are increasingly centralizing, and moving control to corporate hands, rather than public bodies.

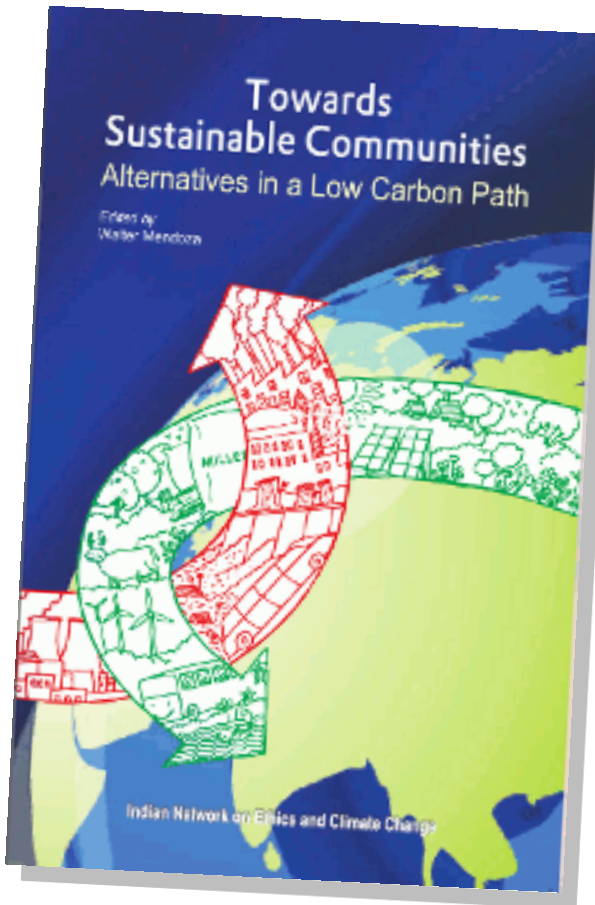
## Sustainable Development?

Sustainable development has become a buzzword in all climate change policy discussions. The Brundtland Commission defines

sustainable development as ‘development that meets the needs of the present without compromising the ability of future generations to meet their own needs’

Economic well being, social equity and environmental sustainability are integral to this process. How does this concept of sustainable development play out in policy terms in a large country like India is a large developing country where nearly two-thirds of the population depending directly on the climate

sensitive sectors such as agriculture, fisheries and forests.



What is to be done!

Tribal communities living in close proximity with biodiversely rich landscapes, having evolved location specific and innovative livelihood strategies based on their traditional knowledge. The communities are interact with the impacts of Climate change. If livelihoods are to be maintained or improved, it is important to enhance indigenous ecological knowledge and improving marketing structures for forest-based communities. NTFP harvesting must be accompanied by appropriate incentives to minimise ecological impacts, even as we seek long-term livelihood alternatives.

Some potential measures that can be taken up to protect forests by promoting natural forest regeneration; strengthening legislation for forest conservation; adopting sustainable timber extraction practices; prevention of forest fragmentation etc.

Dr. Sudarshan of the VGKK Trust(*Vivekananda Girijana Kalyana Kendra*) for tribal development in the Biligiri sanctuary 25 years ago, says the country's rural employment scheme should be implemented specifically for ecological rehabilitation in Western Ghats, like the setting up rainwater harvesting and watershed constructions, and:

- Sustainable harvesting of NTFP and processing – such as Honey, Amla and herbal medicines.
- People's action against forest fires, poaching and quarrying.
- Capacity building of Tribal Co-operatives.
- Environment education in schools.
- Conservation education and eco-tourism.
- Sustainable agriculture – organic farming and seed bank promotion.
- Forest Gene Banks as a new approach for in situ conservation of genetic resources

Involving stakeholders (the communities) in decisions making is vital for developing and implementing any successful conservation plans.

## **Fisheries**

A study of CO<sub>2</sub> emissions per ton of fish catch should that mechanized boats emit more than double per tone of fish catch.

Mechanised boats: trawlers- 1.67 tce, gillnetters: 1.79 tce, dolnetters: 1.45 tce, and compared to 0.48 of motorized boats, and almost negligible for traditional catamarans.

Yet, in the field of fisheries and coastal livelihoods too, we find that the emphasis of developmental efforts is on development of large aquaculture farms, and mechanized fishing by setting of fishing harbours, rather than promoting local beach landing sites and small marketing yards.

## **Energy**

According to an expert committee of the Planning Commission on Integrated Energy Policy. (August 2006), 'India needs to sustain an 8% to 10% economic growth rate, over the next 25 years, if it is to eradicate poverty and meet its human development goals. While it is true that the development of marginalized populations living in rural areas would require exponential increase in energy, what needs to be questioned is which parts of the 8 to 10% economic growth will actually benefit these populations, and which parts will only increase CO<sub>2</sub> emissions, that ultimately impact and worsen the situation of the 60 %. These population are Adivasis , Dalits , fisher-folk, small-scale farm families, livestock who largely depend upon local natural resources and eco system services. Their energy needs are largely fulfilled by these decentralized energy resources.

The share of decentralised energy (energy which is locally managed and controlled) is hardly recognized. Further small scale projects serving the energy needs of remote habitations, especially Adivasi communities, are left isolated. Technological development and upgrading of these system have at best been museumised. In fact, most of the renewable resources have been usurped by the centralised energy in manners and proportions that make these resources non-renewable.

An important example of these are the large wind farms which have been put up in hilly terrains. These farms have cordoned off high forest tracts which local populations accessed for their fuel, and food needs. Shabbily done roads to these mills, cut through verdant forests, and dump debris all along the slopes destroying natural vegetation and disturbing habitats. Trees are not allowed to regenerate as they interfere with the so called wind flow. Worst of all the electricity generated goes over the heads of the local populations.

Civil Society groups have played a pro-active role in demonstrating the potential and in influencing policies based on grassroots realities - working on a wide range of DEOs: solar, micro hydro, smokeless 'chulha', bio fuels, etc. The results of such experiments and innovation are lessons in sustainable living; and need to be included in any 'planning' for a low carbon alternative.

### **Agriculture**

Agriculture too presents a similar developmental question. India's agriculture policy, in focusing only on conventional agriculture to the exclusion of traditional agriculture still practiced by lakhs of small farmers, has remained myopic and witnessed stunted growth. The emphasis on wheat and rice through the National Public Distribution System (PDS) has, for instance, forced people to grow water-guzzling paddy in rain-fed arid zones by marginalizing coarse cereals that had the double advantage of being suited to the agro-ecological zones and being more nutritious than wheat or rice for poor farmers who cannot afford to buy food from the market to keep malnutrition at bay.

Several farmers practicing sustainable agriculture have also found that traditional crop varieties, and even local animal breeds, are more resilient to the changing climatic impacts than 'imported' crop varieties and animal breeds or cash crops grown as a single, stand alone crop.

The approach of the Mission, however, is not pro-small farmer and continues to be technology and market driven, ignoring several

studies and field experiences that have proved that small and marginal farmers, who produce most of the food in developing countries cannot afford purchased inputs and large machines but need vitality of local natural resources to ensure sustainability of agriculture.

A lot more money and resources will be spent on bio-technology, finance company friendly risk management options, than on strengthening non-chemical inputs systems, which are responsible for most of the agriculture related emissions.

Sustainable practices such as organic farming, natural farming can help farmers adapt to the changing climate. Integrated farming systems based on locally available resources by including trees, livestock, water management can help mitigate climate change to a large extent and improve the quality of life of the farmers.

According to the FAO study of 2007, organic farms use on an average 33 to 56 per cent less energy per hectare. Organic farming reduces its fossil fuel dependence in many ways.

Crop rotation and usage of biological fertilisers(organic compost) can increase the soil carbon content and thus help in sequestering carbon. Integrating trees in farms helps in feeding the livestock, as well as improving soil organic content, they also help in minimising water run-off during rains. Livestock, specially the local breed improve the soil organic content with manure, they can be fed with fodder(crop residues) without burning. Used as recycled biomass, crop residues potentially translates into organic carbon. Thus, by implementing soil conservation schemes, changing from mono-cropping to multi-cropping by including legumes, rotating crops, planting tress and harvesting water, we can reduce the carbon footprint of agriculture to a large extent.

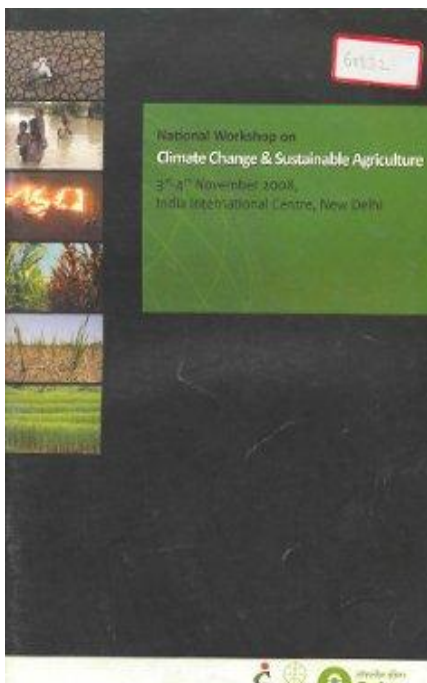
## A Viable Living for the Farmer

The other argument put forward by the establishment is that for farms to be economically viable, they need to be upscaled in terms of technology and size. It is only then that the farmer will be in a position to earn more for their occupation. In fact the entire subsidy for farm inputs, from seeds, fertiliser to chemicals, electricity and irrigation, has been justified on the ground that if the farmer cannot make a living out of agriculture, the food security of the nation stands threatened.

There is however a need to figure out which farmer, is being sought to be helped. Except for the green revolution areas like Punjab and Haryana, farming economics is multidimensional and unless this is taken into account while deciding policy, the farm subsidies are only going to those farmers who use a lot of external inputs.

Conventional economics looks at livelihoods in a single dimension where every household has to engage in one economic activity, which should sustain itself. The reality in small farms is just the opposite. Those whom we call subsistence farmers practice sustainable agriculture, and have a diverse source of livelihood. By injecting subsidies for external inputs like fertilizers, and pesticides, this diversity based livelihood is effectively destroyed, making a subsistence farmer destitute, which is the real reason for the high rate of farmer suicides. In addition most of these so called intensive practices, actually increase the carbon footprint of the farmer. .

The National Workshop on Climate Change & Sustainable Agriculture, organised by the Centre for Sustainable Agriculture, stressed the need to build internalized input based production systems which are low water demanding, and are based on location-specific cropping patterns. Farming needs to be aligned with locally adapted crop varieties and agro-diversity based cropping systems.



**Dr. Sheshagiri Rao** an agricultural scientist, who is also a practicing farmer, in Pavaguda in Karnataka, another semi –arid region, says that the local small farmers can manage climate change well. He says “people in the semiarid region like ours or the entire South India semi arid region, need not be too worried about climate change or increasing extremes. We are used to climate variability and we have always lived with climate variability, variability in rainfall and variability of temperature, which we already have. We have seen the simulation model results of these scenarios. It shows a variability of 2-3 degrees of temperature, and may be 10% shift in the rainfall. But look at our variability. If for Ananthpur & our region annual rainfall is 51cms, the standard deviation is about 19.6 or about 21, you see almost 40% of the average is variability itself. In this huge bandwidth of variability if there is going to be a shift, it is not going to cause a huge problem for us farmers. It may cause a lot of problem to the nature. Even that I believe as farmers and farming are concerned climate change is not going to be a big problem because we have a larger problem of

What is to be done!

the climate variability in any case in which climate change affects are hidden. So I believe that if you adapt to climate variability, which we have been doing for so long, you don't need a special adaptation to change itself. The small farmer cannot take a hit in production. His adaptation must mean resilience at his farm level itself. This means that he must go in for diversification. ShivShankar, a field worker of accion fraternal, is encouraging Venkat in Mallenipalli to grow a variety of vegetable, grain and horticulture plants and trees, in succession, and tandem in small plots, which can only be managed by human labour.



Dr. Malla Reddy, the director of AF has thus called for diversification of land use, and a mixture of annual crops, perennial crops, fruit trees, fodder trees, timer trees etc. There must provide subsistence and food, as well as cash or commerce, and also provide for other habitat needs. Very important is that our agriculture itself should provide additional environmental services, rather than consume or pollute them.



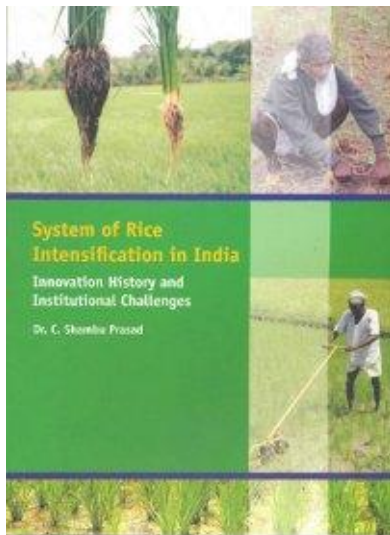
Timbaktu is promoting natural regeneration of forests in the Kalpavali Range, and in the villages developing models for economic viability of organic and non-chemical agriculture.

WASSAN has introduced programmes to prepare the community to face drought situations. Krishna Reddy from Kadiri area working on groundwater sharing, says their effort is to reduce the usage of groundwater and sharing it with farmers who do not have borewells, so that their crop can be saved by providing critical irrigation for the rainfed crop.

Navadanya, a support organizations feels strongly that adaptation strategies must address the issue of the commons, in addition to diversity. They emphasise that Climate change is not a linear phenomenon of warming everywhere, or more rain or less rain. It is a non-linear phenomenon, and it is better to talk of climate chaos than climate change or global warming.

Navdanya is creating community seed banks for climate emergencies so that the widest varieties of crops are available to communities to respond to climate related disasters. And this diversity is available as a commons. That is why, besides setting up community seed banks.

The solution to the dual crises of climate and flood is to promote biodiverse, ecological, organic farming, which produces more food at lower cost, while reducing greenhouse gas emissions and increasing the resilience of farming systems to climate chaos, and enhance the capacity of agriculture communities to adapt to climate change.



What is to be done!

It would be ideal if the method for adaptations to climate change coincides with measures required for mitigation. In agriculture this seems to be provided by diversified or integrated farm activities, ecological farming practices which can maximise use of local resources. Many of these practices are based on indigenous knowledge and focus on building soil biological productivity. Non Pesticidal Management, Organic Soil Management, Community Seed Banks, System of Rice Intensification, soil moisture management, Localisation of markets etc have already proven to be useful.

The challenge today is that no country has been able to delink growth from a rise in CO<sub>2</sub> emissions, or show how to build a low carbon economy or re-invent the growth path. Countries like India and China are still building their energy, transport and industrial infrastructure and therefore give the world the opportunity to "avoid" additional emissions. We can build our cities on public transport; our energy security on local and distributed systems - from biofuels to renewable; our industries using the most energy-efficient and pollution-efficient technologies. Our leaders can be key players at this critical juncture. They can provide leadership to the rich and the poor world by showing a different pathway to growth.

The Climate Action Network, South Asia (CAN-SA) has recommended in its national level consultation, that both mitigation as well as adaptation measure must be taken. They have strongly suggested that the solutions lie in shifting the emphasis from centralized production systems to decentralized, bioregional production and that any alternative should essentially protect the lives and livelihoods of people. That should be the precautionary principle observed in planning and decision-making.

In a declaration at the National Workshop organized by the Indian Network for Ethic on Climate Change (INECC) titled "Peoples' Voices in the Domestic and International Climate Change Agenda" held at Visakhapatnam in November 2008, these voices said...

The traditionally-rooted communities, usually the marginalised rural communities, have preserved the environment for centuries and they continue to do so... The country needs to find ways of responding to the issues of the ecosystem communities because they are the first to suffer the ill-effects of Climate Change.... Thus Climate Change is an issue of inequity which leads to food insecurity among the poor... The communities and many more civil society groups have therefore to be involved in the search for alternatives, with a focus on the poor and vulnerable groups. Adaptation to and mitigation of Climate Change is possible by preserving/protecting bio-diversity, forests, using agricultural waste for bio-fuels and through livestock improvement, organic farming, better governance of electric power production and distribution, undertaking renewable decentralised energy options such as micro or 'nano' hydro, photovoltaic solar based home lighting systems and biomass based initiatives...

The communities and many more civil society groups have therefore to be involved in the search for alternatives, with a focus on the poor and vulnerable groups. Adaptation to and mitigation of Climate Change is possible by preserving/protecting bio-diversity, forests, using agricultural waste for bio-fuels and through livestock improvement, organic farming better governance of electric power production and distribution, undertaking renewable decentralised energy options such as micro or 'nano' hydro, photovoltaic solar based home lighting systems and biomass based initiatives