

## Rural Development on Climate Change: Fallacy or Fantasy?

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**Abstract:** *Currently climate change due to development is given much attention by the development practitioners. At the same time development cannot be ignored in fast developing nations. Most of the researchers concentrate on the effect of climate change on rural development. But this paper examines in different angles how the rural development efforts have both positive and negative impact on climate change. Agriculture is not only affecting by climate change, but contributing to it by mitigating the adverse effect of Carbon Dioxide. But with increasing growth of population demands new lands for agriculture, settlement, pasturing herds of cattle, commercial logging, mining charcoals, bush fire, slash and burn agriculture, over grazing, soil degradation, burning of fossil etc. Development of roads and rail ways, transport and communication facilities, education and health service, etc...are playing their role on climate change positively or negatively.*

*Fossil fuels and nuclear technologies served as a core source of global energy but they are the sources of carbon gas emissions and non-degradable nuclear waste which are the causes of serious environmental problems. Information and Communication Technology plays a significant and more strategic role in creating awareness about the risk, mitigation and monitoring. Enhancing quality, accessible, affordable and efficient educational and health services contributes significant role for building of sustainable environment. Non-farm activities alleviate the burden of carrying capacity of the land. Hence community, government and other stake holders have to play a lot in this regard to achieve sustainable rural development.*

**Key words:** Rural Development, Climate change, Agriculture, Non-farm activities, Stakeholders

### 1. Background and Rationale

Development and Climate change are two factors that influenced to each other negatively or positively. Development is a process of improving the living condition of poor people through coordinated effort of the community members, the government and other stake holders. In this process development affects climate change and climate change in turn affects the live of the poor people in particular, because of their weak adaptive capacities. Development projects of all kinds can strengthen or weaken those capacities. At the same time, they can influence greenhouse gas emissions, the main cause of climate change, positively or negatively. However many attempt has been made by development practitioners in different parts of the world to develop the rural areas since majority of the people in developing nations resides in rural areas. In this paper, therefore, we will assess the impact of rural development on climate change and vice versa. Finally suggests the possible role of public and government in climate change mitigation and adaptation strategies.

When we think about development its literal meaning may relate to the realization of potential, growth or expansion of something, or making something more effective. Its dictionary meaning also is not far distant from the above cocept that expresses as: “the process of developing or being developed; a specified state of growth or advancement”. Christenson et.al., (1989) defines *development* as a process that increases choices, new options, diversification, thinking about apparent issues differently and anticipating change. Development involves change, improvement and vitality – a directed attempt to improve participation,

flexibility, equity, attitudes, and the function of institutions and the quality of life (Shaffer, 1989).

Now, we need to combine the term rural with that of development. Rural- refers to the characteristic of the countryside rather than the town. Almost all countries of the world have a large rural sector characterized by low economic growth and high levels of poverty. Rural development, therefore, is a comprehensive and multidimensional concept that encompasses the overall development of rural areas with a view to improving the quality life of rural people.

According to United Nations' definition, "rural development is the process by which the efforts of the people themselves are united with those of governmental authorities to improve the economic, social, and cultural conditions of communities, to integrate these communities into the life of the nation, and enable them to contribute fully to national progress. This complex of process is, therefore, made up of two essential elements: the participation by the people themselves in efforts to improve their level of living, with as much reliance as possible on their own initiatives; and the provision of technical and other services in ways which encourage initiatives, self help and mutual help and make these more effective (United Nations, 1963) in Christenson and Robinson (1989). Rural people must follow an approach that enhances community participation, ensure social justice and mutual respect, encourage self determination and self-reliance for sustainable development.

## **2. Effects of Rural Development on Climate Change**

To achieve the objectives of physical, financial, human, social, cultural, political and environmental aspects of development, the process obviously interacts with environment and climate. Development and climate change are highly intertwined: The increasing developmental pace may contribute for the risks of global warming (climate change), and this in turn could jeopardize the rural development efforts, especially in the poorest regions of our planet. It is therefore vital to work on development projects that can strengthen their beneficiaries' capacities to confront climate change. In the course of action for rural development, anthropogenic causes of climate change became the main contributing factors for global warming. The burning of fossils, forests and other biomasses, mining of limestone for cement making, and other activities are some cause of greenhouse effects.

***Signs/ Evidences for Global Warming:*** Melting of snow and ice, and rising global average sea level, floods and storms, cyclones and El Niño, heavy winds, prolonged drought, epidemics, etc. are some of the signs of global. According to Intergovernmental Panel for Climate Change (IPCC), more climate change is on the way resulting from past, current, and future greenhouse gas (GHG) emissions with its potential adverse impacts on socio-economic development of nations.

The less developed countries (specially the rural people's) GHG emissions are closely linked to basic needs of the population: food production (through livestock farming) and heating. The diffusion and use of modern innovation for facilitating the development process such as machineries, industries, transport facilities, and etc. have also contributed for the climate change. The positive or negative impact depends on the effectiveness of rural development policies and programs, role of the implementing partners and the community in large. Therefore, rural development has a great impact on climate change, and communities should play their role in global warming mitigation and following their government's policy of pollution control and

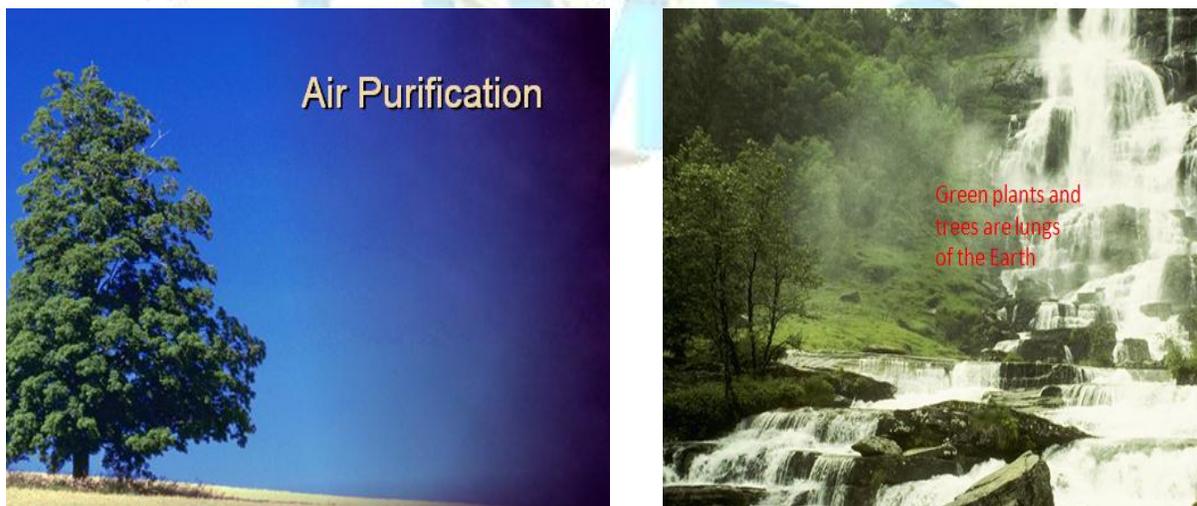
reduction of GHG emission. In the following sections let's see the positive and negative impacts of rural development.

## 2.1 Agricultural Development and Climate Change

Agriculture like all other human activities does not only affecting by climate change, but contributing to it. Agricultural lands contribute about 12% of global green house gas emission (International Trade Center, 2007). According to IPCC, the entire agriculture sector contributes about 25-30% greenhouse gas emission, if it is not properly handled (Burker et.al. 2007)

### *Positive side*

- Afforestation and reforestation activities have considerable positive contribution to mitigate the adverse effect of Carbon Dioxide (CO<sub>2</sub>). Indeed reforestation also helps to improve land degradation and soil conservation practices.
- Use of agro-forestry in the agricultural development has significant role in reducing soil erosion and regulating the release of rainwater. It helps to recover the degraded lands. Trees are the main agents to reduce carbon gases.
- Effective soil conservation practices, soil nutrient management, grassing management, restoration of degraded soils, etc have played positive impact in mitigation of climate change.
- Agriculture is the cradle for all other development aspects. Therefore it plays significant role in strengthen the weak adaptive capacity of the rural people.
- Rural development projects that enhance community knowledge and skills on natural resources management. Introduction of fuel efficient technologies; agricultural activities that based on scientific research and experimentation, all have their positive impact. The following figure shows us what trees play in purification of the air.



**Figure 1: Aforestation for Air Purification and Water**

**Negative side:** The farming activities have also contributed negative effect on climate change. With increasing growth of population size, societies need a new lands for agricultural expansion, settlement purposes, pasturing herds of cattle, commercial logging, mining charcoals, deliberate and undeliberate bush fire, slash and burn agriculture, over grazing, soil degradation, burning of

fossil (like coal, natural gas, oil) etc. These are some of the man induced activities that exacerbates climate change in relation to agriculture. Emission of nitrous oxide from high soluble nitrogen elements, manure handling, biomass burning, enteric fermentation products from animals such as goat, cow, sheep, camels etc are additional factors for its negative impact.

In developing nations, GHG emissions are dominated by agriculture, which contributes 80% of the total GHG emissions. This reflects the fact that livestock farming goes together with high methane emissions. The dominant position of livestock farming also influences the relative contribution of GHG to the total emissions. These are dominated by methane emissions, which account for 80% of the warming potential (Keller, 2009).

## 2.2 Infrastructure Development on Climate change

Development of roads and rail ways, transport facilities, communication facilities, education and health service infrastructures, etc...are playing their role on climate change positively or negatively.

**Positive Side:** Infrastructural developments are the base for human skill development, capacity building, improved information, and then environmental improvements. It enables to get efficient services and gives advantage for time savings, access to school enrolment, access to health services, income improvement, employment opportunities etc. Especially roads and other transport infrastructures enable rural people to get:

- Adequate transport with fair costs,
- Expanded and time saving extension services,
- Greater free time because of substitution of goods (electricity, gasoline, natural gas in the place of fire wood).
- Better access to markets, health and education facilities and higher prices for produce
- Installation of facilities like electricity, communication services, metrological services, government institutions, development agency activities etc.
- It serves as a linkage between urban and rural
- Enhance rural people's mobility and exposure to development, fastens awareness etc.
- Facilitates aforestation and reforestation works, and other agro - extension works etc.
- Therefore rural people able to know about climate change and its effect on life, and its mitigation mechanisms.

### *Negative side*

- It expose to destruction of trees,
- Enhances commercial activities of fire wood and charcoal to the urban places,
- It exposes pure rural remotes to the exhaust fumes from motor vehicle and small scale industries,
- It opens a way for disposal of wastes from the nearest cities
- Unprotected mining activities lead to land degradation and erosion.
- All energy used has also their negative effect.

## 2.3 Energy usage on Climate Change

Fossil fuels and nuclear technologies were/are served as a core source of global energy production for decades. But they are the sources of carbon gas emissions and non-degradable nuclear waste which are the causes of serious environmental problems and the greenhouse effect. If we take the Ethiopian case as an example, in addition to agriculture, the energy sector (heating, cooking, and trans-port) contributes to the total GHG emissions with 15%. 95% of the energy consumption is satisfied by bio-mass sources (mainly wood); petroleum and electricity have of minor coverage (Keller, 2009). Therefore, the future GHG emissions will likely increase with the projected increase in population.

With the new trend of rural development, however, hopes are laid on the source of sustainable renewable energy production that are clean, cheap and ‘green’. Some of these alternative energies are: solar energy, wind energy, biomass energy, hydropower energy, and geothermal energy. These alternative powers have positive impact in reducing the carbon emission to the air and they are renewable if they are managed properly. They are expecting to have the potential to provide long-lasting solutions to the problems faced by the economic and environmental sectors of nations.



**Figure 2: Pollution from Energy Use**

#### **2.4 Information, Communication Technology (ICT) on Climate Change**

As lack of awareness of the rural people is the main aggravating factor for climate change; ICT plays a significant and more strategic role in creating awareness about the risk, and how to mitigate, monitor and adapt that risk of climate change. ITC provides information that is reliable, context-specific, targeted to local audiences, delivered in non-technical language.

Heightened awareness motivates community discussions on potential responses and willingness to engage in action. They can take practical action on issues like forest management, agriculture management, land tenure and use, water resources management, environmental health, political decision making, and participation etc. All in all ITC helps rural agricultural communities to

undertake effective responses in face of the challenges and the opportunities posed by climate change.

## **2.5 Education and health facilities on Climate Change**

Enhancing quality, accessible, affordable and efficient educational and health services contributes significant role for building of sustainable environment. Eliminating major diseases, improves child and maternal health, combating HIV/AIDS and malaria, access to clean water and sanitation facilities, adequate nutrition contributes to better health and higher productivity citizens, that in turn enables to build sustainable community in sustainable environment. Capacity building of people, awareness, information and knowledge sharing all can help people to use their potentials on reducing the climate risk.

## **2.6 Development of Non-Farm Activities and Climate Change**

With the growing number of population increase, the rural labor force also is growing rapidly, but employment opportunities are not keeping the pace. Since land for agricultural purpose is so scarce, enhancing non-farm activities is the only option to eradicate poverty and succeed rural development. Non-farm activities can be trade, manufacturing, communication, transportation, construction, household industries, small scale industries etc. Non-farm activities increase economic growth, improve income distribution and alleviate poverty. It reduces labor migration and gives alternative opportunities to rural people. Non-farm activities also alleviate the burden of carrying capacity of the land. If rural developers be able to use power efficient non-farm activities, it has positive contribution to climate change.

## **3. Mitigation Strategies for Climate Change – Role of Stakeholders**

We have discussed about positive and negative impacts of rural development on climate change. With those cause and consequences in mind it is time to look at societal and governmental roles on mitigation of the climate change and enhancement of sustainable rural development.

**3.1 Role of Public:** Being one of the sources of climate change, rural areas can and should also contribute to mitigation. Examples may include bio-fuel generation from agricultural biomass or solar energy replacing power using fossil energy, afforestation and reforestation for carbon sequestration. Mitigation should also include the livestock sector as the major player, responsible for 18% of greenhouse gas emission (FAO/LEAD, Livestock's Long Shadow, FAO, 2006). Mitigation projects in the livestock sector could aim for intensification, improved diets for ruminants to reduce methane emissions or improved manure management. There are established official and various private mechanisms through which rural people can even be compensated for mitigation activities. The 'Kyoto Protocol' provides a Clean Development Mechanism (CDM), through which industrialized countries can implement emission - reducing projects in developing countries in return for certified emission reductions. Special adaptations will also be needed in coastal low lands, in rangelands and in wildlife management.

In line with the provisions of the 'Kyoto Protocol', the international donor community is expected to provide support of adaptation efforts. Yet, most rural communities are not fully aware of the opportunities for investment in adaptation. A worldwide concerted effort is needed,

including research and technology transfer. For its best implementation, the cooperative effort of each country's government with the people is highly required

**3.2 The Role of government:** Government as major political decision maker and policy maker institution has a great role to play in climate change and empowerment of sustainable development works. Some of them are:

- *Promotion of sustainable adaptive practices:* As water is one of the most constraining factors for rural, natural resource dependent communities, the development of water harvesting and storage systems, as well as increasing water use efficiency, are likely to figure as key activities. The promotion of land management techniques and crops which are adapted to new environmental parameters will be essential. Women, who are considered as being among the most vulnerable to climate change, but are also among those with the greatest potential to bring about change, must be involved in these activities and a special emphasis should be placed on the implications that the identified mechanisms will have on women's workload and drudgery.
- *Disaster risk reduction:* Creating awareness among communities of potential risks and hazards is a key activity for reducing their vulnerability to climate change impacts. In this context, providing information will be crucial to enhance their capacity to adapt. It will also be important to motivate communities to make use of their rich traditional knowledge about disaster risk preparedness and prevention and to make implicit knowledge explicit.
- *Diversification of livelihood options to build resilience:* Livelihood diversification is one of the most important strategies to build communities' resilience. Identifying, piloting, and critically assessing innovative livelihood options will contribute to strengthen the protective and adaptive capacity of communities.
- *Institutional strengthening and climate change mainstreaming:* Adaptation to climate change never occurs in an institutional vacuum. Organizations (traditional, civic, public, and private) play a vital role in shaping the rural development programs and climate change adaptation.
- Efforts should be made to strengthen micro, mezzo and macro level institutions and mainstream adaptation to national planning, development and policy decisions.
- *Communication and awareness rising:* Support for participatory impact and vulnerability assessments will serve as a way of raising awareness within communities of the changes affecting their livelihoods, while at the same time contributing to highlighting their own capacities to adapt and the emerging opportunities that control and mitigate to climate change.

#### 4. Conclusion

Rural development is a process that leads to not only more jobs, income and infrastructure, but also communities that are better able to manage change. Community members can better mobilize existing skills, reframe problems, work cooperatively and use community assets in new ways to control and mitigate their problems. As it is discussed above, climate change is a real threat to the lives and livelihoods of millions of people especially in less developed countries. Less developed countries are highly affected because of their loose potential to challenge the problem. Therefore rural development requires proper policy, programs and strategies of implementation that enable the less developed countries: (a) implementing development

programs which minimize and mitigate the climate change and maximize the works of reforestation, afforestation, agro-forestry, rehabilitation of degraded areas, re-vegetation, control of free range grazing, and which controls the effect of carbon emission starting from the communities daily consumption to the hazards of pollutant factories and motor vehicles and other pollutant waste, (b) integrating Agriculture and Rural Development Policy and Strategies (c) having adequate, effective and far reaching information system, education and health systems, and other infrastructures, and enable people to have full knowledge concerning the problem (d) enhancing non-farm activities which help to reduce the burden of the educational sector (e) improving natural resources management and conservation (f) enhancing community awareness, knowledge and attitude toward the development process by in large and the impact climate change, and hence enable them to take cooperative actions (g) establishment or strengthening of appropriate national institutional arrangements; adequate research and development programs, to support the scientific and technical capacity to develop, choose and adapt technologies, including testing and demonstration facilities and research focal-points in new and renewable sources of energy (h) specific programs to promote the exploration, development and utilization of new and renewable sources of energy, taking into account (as appropriate) social, economic and environmental considerations (i) mobilization of adequate human, capital and other resources for the purpose of sustainable development (j) developing qualified personnel with specialized education and skills and providing adequate education and training programs, with equal access for men and women. Giving focus for these development policies and enhancing collaborative work with all the countries and communities of the world, we can achieve sustainable rural development with sustainable environment and sustainable community.

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