

## Proceedings of the state-level consultation

on

# NEW APPROACHES IN BIORESOURCES GOVERNANCE: CLIMATE RESILIENT AGRICULTURE IN TRIBAL AREAS

A one day workshop was organised on 'New approaches in bio-resource governance – Climate resilient agriculture in tribal areas' on 12<sup>th</sup> Dec 2011 at CYSD – DRTC, Bhubaneswar by Regional Centre for Development Cooperation (RCDC) in technical collaboration with OUAT (Orissa University for Agriculture and Technology) and CTCRI (Central Tuber Crops Research Institute), Bhubaneswar.

**INAUGURAL SESSION:** Mr. Bikash Rath, Senior Program Manager, RCDC formally welcomed the guests on the dais and the representatives from 6 districts to the day long consultation on climate resilient agriculture in tribal areas. Sharing the objectives of Bio-resource governance program that has been operational in 112 villages of 5 GPs in 4 districts namely Kalahandi, Gajapati, Rayagada and Koraput



since 3 years, he said that the aim of the project was to help in the overall development of the bio-resources of the target villages by empowering the community. He then went ahead to share his concern over the growing changes in climate and the effect of the same on the life of marginalised communities who are directly depended on agriculture for their living. He said that owing to changes in climate, agriculture is worst affected as there is no certainty of time and duration of seasons especially rain. Moreover, temperature has been on an increasing trend and this is also affecting agriculture. In tribal areas where irrigation has remained a crucial issue, the problem has aggravated in the recent years owing to the uncertainty of rain. As RCDC doesn't favour resolving this issue through intensive chemical farming or use of controversial genetically modified planting materials, hence the consultation intended to provide an opportunity to both the scientists as well as the tribal farmers to interact and discuss some solutions that would sustain despite lack of irrigation, would not require intensive farming or chemical farming, and would be still useful in ensuring food & nutritional security, he clarified.

He said that the organisation is obliged to have with them senior scientists both from OUAT and CTCRI and community representatives from 6 districts most of whom are farmers. He requested the participants to have direct interaction with the scientists and try to clarify

their issues directly from them. ***'This is not a lecture session but a direct interaction of specialists with the beneficiaries, an opportunity that needs to be properly cashed,' he emphasised.***

***This was followed by a round of introduction by the participants.***

Professor Sankarshan Nanda, Dean, Extension, OUAT and Chief Guest for the occasion then requested the participants to give a brief idea about the main issues faced by them in the context of their agricultural activities. Most of the participants saw drought as the most crucial issue faced by them in the current agricultural season. Lack of good seeds was an issue in the Gumma Block of Gajapati district whereas in the Bandhugaon Block of Koraput district, where most of the fertile lands have been diverted for non-food crops like lemon grass, soil erosion in the hills followed by siltation/inundation of the low lands (agricultural) was reported to be a matter of concern. In Bhutigarh GP (Kalahandi), many of the low lands have been left fallow as people say these lands are not much viable for agriculture and hence they prefer hill cultivation.

Sri Dillip Pradhan, Programme Officer from Nabarangpur district expressed his anguish over the repeated negligence of the agricultural sector by the government. He meant to say that despite its claims, investments and programmes for the development of farmers and agriculture the government has not been sincere and keen enough for a sustainable development of this sector; rather it has promoted many other sectors like mining & industry. He cited an example of an indigenous variety of paddy, *satka dhan*, that is harvested in a 60-day period and is suitable for relatively dry areas, is now becoming extinct gradually with the increasing dominance of maize in the district; and this is happening because the government has neglected the indigenous practices and has promoted practices that are costlier, environmentally degrading, and also against the interest of the local farmers.

## **TECHNICAL SESSION -I**

The technical session started with an address by Dr. Nanda, Dean, Extension, OUAT. To begin with, he congratulated RCDC for having created an opportunity wherein scientists can directly interact with the beneficiaries. He said that the fact climate is changing is accepted by all and its impact is being felt at all levels throughout the world. He opined that a one day workshop is not sufficient to address all issues concerning impact of climate change on agriculture, but the forum would give an opportunity to both the participants and the scientists to discuss some of the major immediate issues concerning both. He then went ahead to give a brief idea of the agricultural pattern of the state, area of land under paddy cultivation and how Koraput has become one of the genetic hotspots of wild rice leading to the establishment of MS Swaminathan Foundation Research Centre in that region. Referring to the huge loss of food grains due to the impact of climate change he however said that

although we can't totally mitigate climate change we can definitely adopt practices that would help us withstand the impact of this change to a great extent.

Raising concern over the decreasing trend of paddy production in the state, Prof. Nanda said that if the same was owing to climate change only then how was it possible that Chhattisgarh, a nearby state was still able to go in for record production of paddy. He felt that it was owing to the political will that Chhattisgarh has been able to consistently maintain its production level. Even in case of the Nuapada district, an entrepreneur from Uttarakhand, who has settled there, has demonstrated excellent farming practices that too with a diversity of crops, whereas the local farmers have been only suggesting only a reducing trend in agriculture. Hence, it is not simply a matter of the impact of climate change, but also of lack of proper entrepreneurship, know how, and facilities that is aggravating the situation of the farmers. Huge inflow of rice from other states is one of the causes that deprive the local farmers of the advantages of the support price system. The state government is yet to establish an organic certification agency which is why KASAM, which is facilitating organic cultivation in about 11400 hectares of land in Kandhamal district, has to depend on external certification agency. Water is available only for about 33% of the total agricultural land of 61.8 lakh hectares in the state. Rain water harvesting, vermin-compost and vermin-wash, and proper crop planning(for instance, in low rainfall areas the farmers should opt for the Vandana and Khandagiri varieties of paddy and not for Swarna), etc. can be some of the key tools that can help improve the situation, he emphasised; and advised to make optimum use the various schemes/support systems provided by the government and other agencies like NABARD. He further said that chemical fertilizer and chemical pesticides are not so essential if farmers can meticulously plan use of the locally available resources, like ash from the reject banana plant(and other plants too) contains good amount of potassium that helps the plant grow better, require less water, and also yield better. Similarly vermin-compost can be prepared from forest weeds. Millet cultivation is gradually gaining commercial importance particularly with growing interest of the high class people in raggi, so this can be a good alternative. The flower business in the state has an annual turnover of about Rs. 20 crores, but most of the supply comes from other states whereas flowers like marigold are not water-intensive and can thus be opted in areas where food crops are not viable.

To conclude, Mr. Nanda said that the geographical condition of the state is such that it cannot leave agriculture and hence there is a need to find out feasible ways to address the issues faced by agriculture here. Moreover, 1% growth in the agricultural sector is equal to 3% growth in the industrial sector which is why agriculture holds a great potential, he emphasised. He said that Krushi Vigyan Kendra also provides mobile service to the farmers and the same needs to be used by the people to their benefit. He even assured that farmers can even call him and the OUAT scientists present on the occasion for any technical consultation.

This was followed by a presentation by Dr. Subash Chandra Sahoo, Deputy Director, Extension, OUAT, on ***Profitable utilization of uplands for economic upliftment of tribal poor.***

***'We treat ourselves lowly, think we are inferior and hence are poor; the day we acknowledge our strength and learn to use it efficiently we will no longer be poor,'*** Dr. Sahoo began his views with these encouraging words. He said that we are lucky that we have good weather and environmental conditions important for good agricultural produce, all we lack is self confidence and the ability to use appropriately all that we have, and hence there is a need to work on this aspect, he felt because he frankly said that we labour hard but only physically and less mentally which is why we do not get the best results of our labour and investments. For instance, we plough only once, that is before sowing, but if we also plough just after the paddy harvest it would help the remnants of paddy plants get mixed with the soil and increase the fertility, in addition to destroying the eggs of pests. Doing this for 4 to 5 years will increase the productivity. He then went ahead to share some of the statistical figures available with them on the use and pattern of use of hilly lands. He felt that these lands are not used in a proper manner and hence there is a misunderstanding that these lands are not viable properties for a poor farmer. Some of the other highlights of his presentation included:

- Paddy with arhar as an intercrop will be more useful for tribal areas because arhar is relatively more capable of withstanding drought. Maize can also be added as another intercrop.
- If the leaves that fall off the trees after winter are dried and turned into compost, it can be applied to the soil for increasing the fertility. He felt that since there is a little scope for the people of this area to use cow dung as manure owing to less of cattle found in these areas, this can be adequately compensated by using the compost or left over of the crops in the field.
- He requested the participants to identify at least 100 people who could form the part of a team formed in each of 5 operational districts of the program. These teams could work out a plan to increase their income by a minimum 1 lakh rupees within the next one year time period. Thereafter they can develop a plan and work accordingly. He felt that if the target of 5 lakhs rupees could be achieved then the next phase would see a good increase in this target as this would motivate many more people to get into the process.
- To address the problem of water shortage he suggested the farmers to go in for modern techniques like drip irrigation, sprinkling method, etc.

Dr. A.K.Mohapatra supplemented Dr.Sahoo's responses with the success story of the TRUPTI Orchard formed in the district of Keonjhar that is spread over an area of 270 acres of land. The farmer owing to his initiative has been awarded with Krushak Shiromani award by Government of India.

Mr. Bikash felt that we all have to make genuine efforts to come over the problems faced by us instead of putting the blame on one another. Moreover, the organisation would try to act as a bridge to ensure that the benefit of various schemes of the government reaches the poor and the marginalised farmers. He hoped that if collaborative efforts are made the scenario would definitely improve for better.



On a query put up by a participant with regard to the cultivation of crops that can be taken up by the farmers of coastal districts especially in areas affected by recurring floods, Mr. Sahoo suggested cultivation of crops like baby corn and sweet corn in winter season, and for summer he suggested taking up of crops like water-melon, vegetables, flowers etc. He felt that the farmers of the areas should not be afraid of

marketing as they are located close to two potential markets namely Cuttack and Bhubaneswar. Referring particularly to baby corn he said it can fetch Rs.100/kg as the baby corn soup is popular. He also referred to *kolatha* (horse gram) as a crop that can withstand even saline water.

Few more farmers went on to put their queries to the scientists, some of the queries raised included:

- Q. Why do *kandula* flowers shed off or not bloom properly if the weather is cloudy?  
A. This may be due to certain pests. If chemical pesticide Imedacloprid is not to be used then Nimajal or neem oil can be used as pesticides. The ratio is 5 ml oil per litre of water (one acre requires about 200 litres water).
- Q. What are the reasons of the failure of the Lalata variety of paddy, despite using bio- manures?  
A. Unless the biological materials are rotten properly they can't serve as manures. Rather such materials in the process of getting rotten in the soil itself may pull on the nutrients from adjoining materials thereby acting adversely. The failure of Lalata crop may be due to lack of potash in the soil. Lack of Boron and Zinc can also be one of the reasons. Increasing the potassium content of the soil is required, besides taking on the measures to improve the soil fertility.
- Q. Why can't we have cabbage seeds in Odisha?  
A. Because our state doesn't have a longer duration of winter required for production of such seed. There are some other limitations too.

***With that note the session was closed for lunch.***

## TECHNICAL SESSION- II

Mr. Bikash welcomed the participants to the post-lunch session. He requested Dr. AP Kanungo, Joint Director(Information), Extension, OUAT, to present his views on ***Subsidiary vocation for livelihood security***.

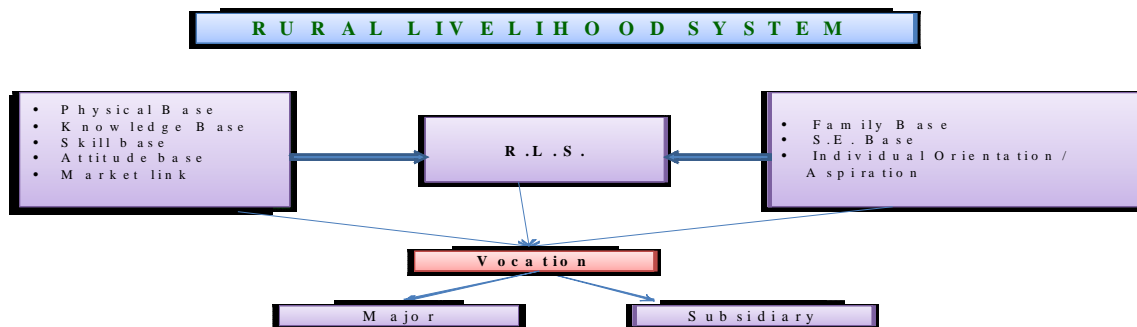
Dr. Kanungo initiated his discussion by giving a brief understanding to the participants on Rural Livelihood System (RLS). He said that the system depends on attributes like knowledge and available resources, attitude, market scenario, need of our family and the socio-economic scenario of the area. Vocation, on the other hand depends on –

- Cost
- Availability
- Visibility
- Compatibility
- Simplicity
- Utility
- Marketability
- Group action.

Thereafter he shared in detail about the pattern of production and marketing behaviour usually observed especially in rural scenario.

The marketing behaviour highlighted by him included –

- Little to sell or buy
- Sell less and buy more
- Sell more and buy less
- Buy to sell
- Resource poor and buy all
- Resource rich and buy more



(Source: Dr. A.P.Kanungo)



He then went on to talk about some of the important viable subsidiary vocations that can be adopted by farmers to increase their income besides taking up agricultural activities. Vocations shared by him included mushroom cultivation, goatary, duckery, apiary, pisciculture, and floriculture, etc.. Thereafter he talked in detail about the financial implication of these vocations giving a clear idea to the participants on the range of profit margin that is achievable by following these vocations and the important risk factors as well.

Participants had few queries with regard to some of the vocations like - significance of rearing combination of fishes in pisciculture, type of goats to be reared, etc. These were adequately addressed by the resource person.

Responding to a question raised by Mr. Bikash regarding the impact on biodiversity of using the Italian variety of honey bee in apiary, Dr. Kanungo said that even the local variety *saptapheni* can be successfully used though that is relatively costlier.

This was followed by a presentation by **Dr. Rajsekhar Misra, Head and Principal Scientist, CTCRI. He made his presentation on 'Commercial cultivation, seed production and post harvest management of tropical tuber crops'.**

Mr. Misra started his presentation by giving a brief idea of the activities being undertaken by CTCRI, major tuber crops on which they have been working and the need for it. CTCRI has developed improved varieties of many such crops, like Gajendra Oluo. He said that the climate of the state is suitable for the production of these crops, and more particularly the situation in tribal areas. Besides this some of the other reasons why these crops need to be promoted, as highlighted by him included –

- They ensure food security.
- Capable of withstanding drought
- These are cash crops.
- Many are used as raw materials by the industries.
- Good quality animal feed.
- Medicinal properties in the products.



Elephant yam(Gajendra variety).  
Photo courtesy: Dr. B.Behera(OUAT)

Some of the important crops that he talked about included cassava, sweet potato, greater yam, white yam, elephant foot, colocasia and arrow root. He talked in detail about the financial implication of growing these crops and the average profit that can be obtained by



their cultivation. Like, he said, arum or *saroo* is supplied from Odisha to Delhi and other parts of North India. Oluo has a bid demand in the Kolkata market but not in Odisha. On the other hand, yam is in good demand in our state but a part of its supply comes from Andhra Pradesh. Odisha is however the highest producer of sweet potato, and CTCRI has developed Vitamin-A rich variety of the same. Thereafter, he shared about the pattern of cultivation of these crops; care to be taken during its production stage, major diseases that affect it, process to be followed to store it and finally the utility of these crops.

On a query from the participants Dr. Misra informed that the planting materials of these tuber crops can be obtained directly from their office at Bhubaneswar by paying the required amount for it. On a request from Mr. Bikash to work collaboratively, he said that the organisation looks it as an opportunity and to begin with, they would expect that RCDC immediately collects information about the tuber crops available in their operational areas and other details about it and share it with them. The organisation would do the relevant research and share the findings of it with them. With regard to use of tuber crop pattern in tribal areas he said that unfortunately people are not aware that many tuber crops are not healthy to be consumed and there are cases where particular tribes are now on the verge of extinction owing to the impact of some tuber crop on their fertility. Also, the stress is on consumption and hardly any attempt is made to replant the crop as a result of which their quantity and even varieties are on a gradual decrease.

His colleague and senior scientist at CTCRI Dr. M. Nedunchezhiyan responded to a query on the value addition and processing of tuber crops, and showed pictures of products made from cassava. He later informed about a saline-water resistant variety of sweet potato suitable for coastal areas.

This was followed by a presentation on **'Agronomic measures suitable for soil and moisture conservation'** by **Dr. J. Sahoo, Joint Director, Extension(Video project), OUAT.**

Dr. Sahoo started his presentation by explaining that agronomic measures help to increase infiltration rates and thereby reduce run off and over land flow, reduce the impact of raindrops through interception and reduce splash erosion. Reduction in runoff and soil losses could be achieved through land management practices and associated agronomic practices. However, these measures are effective on gentle slopes, he clarified.

The major agronomic practices for soil and water conservation according to him are :

- (i) Contour cultivation/farming
- (ii) Land preparation
- (iii) Choice of crops(like, erosion resistant or soil conserving crops such as cowpea, groundnut, greengram, blackgram etc. provide better cover and protection to soil by way of



minimizing the impact of raindrop and acting as obstruction to runoff than erosion permitting crops such as Sorghum, Maize, Pearl millet etc.)

- (iv) Crop geometry
- (v) Crop residue management
- (vi) Cropping systems(for instance, legumes like cowpea, greengram, horsegram, blackgram are effective for soil conservation due to their smothering affect, but they should be sown in time to develop adequate canopy by the time of peak rate of runoff.)
- (vii) Use of organic manures and fertilizers
- (viii) Mulching(for example, crop residues like wheat/paddy straw / maize stalks are left on the soil surface as stubble mulch to check evaporation loss)
- (ix) Strip cropping that involves growing of few rows of erosion resisting crops and erosion permitting crops in alternate strips on contour with the objective of breaking long strips to prevent soil loss and runoff.

Thereafter, Dr. A.K. Mohapatra, OUAT, made a presentation on **‘Agro-forestry to mitigate ill-effects of climate change’**.

To begin, he went on to explain to the participants the concept of agro-forestry, the need for it and how the same could help to not only reduce the impact of climate change but also strengthen the economic position of the poor and vulnerable farmers. He said that the agriculture should be such that it satisfies 7 Fs(food, fodder, fertilizer, fibre, fuel, flower and fish) for a family. He then went ahead to share some of the innovative practices followed by the farmers to achieve maximum profit from their agricultural practices.

He stressed on agro-forestry(like, Arum+Guava+Rosewood or *Dalbergia sissoo*; Cedar or Gambhari +turmeric) and agri-horti-silvipastoral systems(like, mango+groundnut). He cited the examples like banana with brinjal as an intercrop has shown a decreased vulnerability to disease in the latter. Similarly, apiary with sunflower cultivation increases the productivity of the latter by facilitating better pollination. According to him, the species suitable for afforestation in Odisha include the following:

- \**Cassia siamea* \* *Anacardium occidentale* \* *Acacia auriculiformis* \* *Eugenia jambolana*
- \* *Acacia nilotica* \* *Artocarpus integrifolia* \* *Acacia catechu* \* *Aegle mameelos*
- \* *Terminalia arjuna* \* *Annona squamosa* \* *Bombax malabaricum* \* *Emblica officinalis*
  
- \* *Prosopis juliflora* \* *Shorea robusta* \* *Dalbergia sissoo* \* *Tamarindus indica*
  
- \* *Eucaltptus hybrid* \* *Leucaena leucocephala* \* *Azadirachta indica*
  
- \* *Albizia lebbek* \* *Sesbania grandiflora*



Sesame with *Acacia mangium*. Photo courtesy: Dr. A.K.Mohapatra(OUAT)

Dr. Mohapatra provided a lot of interesting statistics relating to the causes of climate change. For instance, he quoted a report<sup>1</sup> that indicated that among different sectors of agriculture in India contributing to climate change, enteric fermentation is the single largest factor(59%) followed by rice cultivation(23%) and emissions from soil(12%). On

the other hand, among the sources of green house gases in India the energy sector is the largest(61%) followed by agriculture(28%) and industrial processes(8%). Agro-forestry can be an important tool in mitigating climate change while taking care of food and livelihood security, he stressed; and ended his presentation with a remarkable note: **Let the farmers donot do different things, let they do things differently.**

Mr. Bikash raised an important issue of calling plantations as ‘forests’, that too even eucalyptus plantations; and asked for the opinion of the scientists regarding the promotion of pulpwood plantations and other such commercial plantations in the name of forestry though the plantations are for short duration harvesting and have many problems. Dr. Mohapatra responded to this by clarifying that they don’t recommend species like jatropha, eucalyptus, or and *Acacia auriculiformis* in agro-forestry. Because these species have certain ill effects on soil (like the alkaloid content of eucalyptus leaf has an adverse impact). However, a nitrogen fixing variety of eucalyptus has been developed that can be considered, he said. On the issue to the shadowing effect caused by trees raised in agricultural fields he said that when the tress grow one has to gradually cut off the lower branches so as to reduce this effect. Still, those already having eucalyptus plantations can have turmeric as an intercrop.

Finally, Dr. B. Behera, Professor, Department of Agronomy, OUAT, talked about **‘Livelihood options for tribal farmers’**.

He started his presentation by sharing the concept of livelihood, need for its security and various livelihood options available in rural Odisha. He said that in tribal areas agriculture is the predominant mode of livelihood options, but some of the important problems related to tribal agriculture are:

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<sup>1</sup> India’s Initial National Communication on Climate Change, 2004

- Cultivation of less remunerative crops – most of the crops grown by tribals are low yielding varieties and are of local genotype. The solution is crop diversification, and varietal substitution.
- Consistent problem of drought, animal invasion (particularly monkey menace) , etc. The solution is tuber crops.
- Poor soil health management leading to soil erosion and acidity problem of the soil, inadequate and imbalanced use of fertilisers, etc.. The solution is soil health management through balanced application of fertilizer, use of paper mill sludge with farm yard manure in deserving areas, etc..
- High run-off loss, hence the need for having on-farm water harvesting structures. The solution is on-farm water harvesting structures.
- Lack of farm mechanization. The solution is the farmers can be provided with farmer-friendly and convenient machines on rental basis by the agricultural institutions, since they can't always afford to purchase the same.

He then talked about problems seen in animal husbandry sectors as well, in these areas. He said that much viable business can be easily taken up by the residents of these areas and the same would contribute to a great deal in reducing the vulnerability of the tribal people. Some of the business mentioned by him included – value added Minor Forest Produces, mushroom cultivation, etc

Mr. Suresh Bisoyi, RCDC, thanked the scientists from OUAT and CTCRI and the participants for having being a part of the workshop and to have contributed positively to the program. He hoped that the informative interaction that has happened during the day would benefit both the scientist and the community members equally. He reiterated RCDCs commitment to work in collaboration with the organisations to benefit the poor and marginalised farmers.

**With that note the workshop was called off.**

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Edited by: Bikash Rath