



Indo-Global  
Social Service Society

# DYNAMICS OF 'CLIMATE CHANGE' AND IMPACT ON RURAL LIVELIHOOD

The Study was conducted at village Hatiduba, Baksa, Assam and  
Chhoto Amra, Seraikela, Jharkhand, India







THE STUDY CONDUCTED BY

**Development Research Communication and Services Centre**

**Kolkata, India for Indo- Global Social Service Society to map the ideas and**

**understanding of the communities on impacts of climate change on livelihood**

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## DYNAMICS OF 'CLIMATE CHANGE' AND IMPACT ON RURAL LIVELIHOOD

### CONCEPTUALIZATION

The most vulnerable group in Indian society is the rural poor as they often depend on natural resources for their livelihood sustaining primarily on agriculture, livestock, fisheries and forestry. Unfortunately, all these resources have, for a long time, been under great threat due to various human activities like over exploitation of natural resources, deforestation, urbanization, excessive use of fossil fuel, population growth, chemical intensive farming etc. which have aggravated the vulnerability of these communities.

According to lead author Kevin Watkins it "may be an unparalleled threat to human development" and "... is not an issue for 50 years down the road; it is an issue for today."

He also warned that crop yield could fall by a third or more in some regions.

**Broad consequences which could be predicted include –**

- Agriculture and rural development which will bear the brunt of climate change
- Extreme poverty and malnutrition will increase

as water insecurity increases

- Extreme weather patterns will increase the risk of floods and droughts
- Shrinking glaciers and rising sea levels will reduce access to fresh water

(UNDP Human Development Report 2006)

Obviously, these climate change impact vary strongly in their extent and form around the country, resulting in a wide variation in vulnerability depending on different agro-climatic locations, people's perceptions, their adaptive capacity and opportunity, socio-economic conditions, environmental factors, political (Local, State, National and International) motivations etc.

Therefore, to cope with the risks, a concerted effort in intervening on the issue will have to be specially adapted to suit the different situations.

Adaptation to environmental change is not a new concept. Each and every living being has an inherent capacity for adapting to different climate and environmental changes for survival. But, human induced climate change invites a new challenge, and may require mitigation and adaptation approaches to changes, that are potentially larger and faster. The Intergovernmental Panel on Climate Change (IPCC) recommended that "adaptation will be

necessary to address impact resulting from the warming which is already unavoidable due to past emissions" (IPCC, 2007).

In 2008, the Government of India launched the country's National Action Plan on Climate Change (NAPCC) to deal with the multi-faceted nature of climate change as a challenge to develop a cross-sectoral integrated approach.

Like many other Government and Non-government organisations, the Indo - Global Social Service Society (IGSSS) has extended its support to the vulnerable communities by adopting climate resilience approach to secure their livelihood at Baksa district of Assam and Seraikela of Jharkhand.

#### **OBJECTIVES OF THIS STUDY:**

- To understand the dynamics of 'climate change' and livelihood.
- To understand the perceived and felt 'changes' at community level and assess the impact (relating to major occupational groups and the livelihood resource base).
- To understand the adaptation (how individuals, groups and natural system prepare for and respond to changes in climate or their environment) and coping mechanism (at community level through self initiative and extension support).
- To develop an understanding regarding the opportunities and possibilities.
- To use insight from the action research for developing a strategy to enhance and train the communities with components of demonstration / action points.

#### **STUDY AREA**

Village Chhoto Amra of Seraikella district of Jharkhand and village Hatidoba of Baksa district of Assam, are the two selected villages for action research.

Geographically the Seraikella district is located at a latitude of 23 degrees, 51 minutes north and longitude of 85 degrees east, while Baksa district is situated at latitude of 23 degrees, 11.4 minutes north and 88 degrees, 54.6 minutes east.

#### **METHODOLOGY**

Participatory method using various PRA (Participatory Rural Appraisal) tools are triangulated with secondary information collected from various (government, NGOs and internet)

sources. Moreover, focus group discussions were also conducted to understand the dynamics of 'climate change' and livelihood pattern for emerging a climate resilience coping mechanism.

#### **PRA**

Prior to Participatory Rural Appraisal (PRA) exercise, the composite PRA team (consisting of village key persons, local IGSSS partners and DRCS personnel) met with the village communities and explained how the PRA results can be used in planning, implementing, monitoring and evaluation of village activities.

Three to four days field exercise (three days at Jharkhand and four days at Assam) retrieved a range of village information using four PRA tools named resource/social map, transect walk, seasonality chart and time line in order to get the perception of village community regarding climate change and its impact on their livelihood.

Active and spontaneous participation from both men and women was found in both Chhoto Amra as well as Hatiduba village. Children and teenagers also joined and enjoyed the programme. A debate was raised in marking the village boundary at Chhoto Amra and ultimately, that was done by women with the approval of others. While depicting the households in social map, the respondent individually marked it. In case of Hatiduba, villagers used chalk and black board before drawing on ground. Though the scaling was not precisely maintained in the map, however, apparently it was estimated considering the walking time.





## MAP

Villagers selected a clean spacious ground under a banyan tree to draw the map at Chhoto Amra. The place was at the centre of the village to ensure maximum participation. At Hatiduba, the site was selected at the premises of primary school which is situated at the centre of the village.

Initially, the villagers were a little hesitant to start the exercise. However, they gradually involved themselves after the intervention of facilitators.

At first, they did the basic map delimiting the boundaries with neighbouring villages, roads, north-south direction and few land marks. This basic map followed by resource map incorporated the village resources they identified. In this exercise very interesting and informative learnings emerged. The villagers identified the land in which presently single crop is cultivated. Few years back there used to be second crop cultivation. This change is primarily due to shortage/vagarious nature of rainfall. This scenario is common for both the villages. They also depicted a number of water bodies in the map mentioning that most of them dry up during summer. The same thing has happened in the case of dug wells.

The map prepared on first day was kept intact for social mapping which followed the next day.

Participation on the second day was much more than that on the first day. This could be due to growing interest among the villagers. A long discussion was held regarding household details like occupation and land property. The information was noted by the facilitator, along with identifying/ marking the specific house hold by owner of the house putting a small stone on the map. This exercise generated tremendous involvement and obviously interest in each respondent. In case of absentee, the household was marked by the neighbour. In case of Hatiduba village, it was possible to collect the land property of individual households which are depicted in the demography table.

## TRANSECT

A small group of 12 to 15 villagers along with facilitators walked through a track of great diversity. To select the track, the villagers keenly observed the resource map they prepared. Only then was the track finalized. In Chhoto Amra, the walk started from southern to northern part of the village, while, in Hatiduba it started from

northern to southern part. Transect provided more detailed and specific information than the map such as soil type, soil depth, topography, cropping pattern, vegetation etc. Moreover, through an analytical discussion the respondents identified the specific problems of a particular ecosystem and thereby tried to find out some possible mitigation measures. For example, to prevent the soil erosion, villagers preferred field bunding at Chhoto Amra village. The villagers also identified a patch which is inundated when Chandil dam releases water during Aman season. Naturally, cultivation during



Aman is not possible. They also prescribed to use that excess water to irrigate the adjacent crop as needed. Similarly, the fallow patches identified at Hatiduba, were suggested for plantation. The 'Dong' committee members expressed to give more attention to regulate the switch gate at hill area (upper stream) so that the flow of water can be controlled to avoid inundation.

## SEASONALITY CHART

The respondents, especially women folk of both villages identified the crisis period of basic needs of livelihood over the year. They illustrated the period, month wise (Baisakh to Chaitra), in a seasonal chart. Each month was represented by drawing pictures of the local festivals which are comprehensible even to illiterate people. The seasonality chart revealed that 'food' availability is limited during Bhadra to end of Kartick in case of Chhoto Amra, while in Hatiduba the time span is longer. The chart showed a month (Kartick) long fodder shortage at Chhoto Amra. However, the picture is more acute in Hatiduba village as the crisis lasts there for 3 months (Phalgun to Baisakh).

During peak summer, even drinking water is scarce in the Chhota Amra region. At Hatiduba this crisis continues for four months (Poush to Baisakh).

**TIME LINE**

The elderly people of the community took the role of key respondents. They exposed how natural resources are gradually degrading day by day and how their forests have become empty, resulting in a condition of infertile soil. They also lost many plant species which were not only food but also a means of livelihood either as medicine or for



household needs. Now as an outcome to constant degradation and exploitation of these resources, it has reached a level where everything has to be purchased. One aged person, in Jharkhand, recalled that about 50 years back there was a severe drought. The community survived mostly on forest produce during that phase.

They also noticed the drastic shift in temperature. Now temperature is seen to be too high, winter span has shortened and even rainfall is unstable and very uneven unlike usual.

The primary data retrieved through various PRA tools, small focus group discussions and the secondary data collected from various sources are as follows:

- VILLAGE:** CHHOTO AMRA
- BLOCK:** ICHAGARH
- DISTRICT:** SERAIKELA
- STATE:** JHARKHAND

**Chhoto Amra:** A tribal village of Seraikela district under Jharkhand state. Drought is an inherent characteristic of Seraikella situated under the

'Eastern Plateau region'.

**Climate and Rainfall:** Almost the entire district experiences extreme hot summer and pleasant cold winter. The average annual rainfall is about 1300 mm of which 80% precipitates during the south west monsoon rain. This erratic behaviour of rain causing soil erosion with often prolonged dry spells are the most important constraints.

**Geomorphology and Soil:** This area is dominated by hilly ranges, valleys and plateaus covered with forests. The Dalma hill range extends from Chandil to Ghatsila. Geologically the area is comprised of Archean lava, laterite and pre-Cambrian fold mountains. The major river flowing in the district is Kharkai. Soil type is mostly red lateritic or sandy loam to clay loam and acidic in nature. Land in mostly undulating terrain, shallow soil depth, low water retentive capacity, poor fertility of soil and fragmented holdings are the additional constraints.

The 40 years data records on rainfall and temperature (recorded at Agro-meteorological observatory located at Kanke, Ranchi) has revealed an increase in occurrence of extreme weather events with marked change in climate of



## DEMOGRAPHY

Village	HH No.				Literacy %	Drop out %	APL %	BPL %	No Card %	Landless %
	Total	SC	ST	OBC						
Chhoto Amra	100	-	100	-	33	13	39	60	1	-



A number of drought tolerant paddy varieties are lost from their farming system. Farmers recalled those varieties. These are Lakhansaal, Karnasaal, Darnisaal, Chandrakanti, Malot, Sada Malot and Vogna.

The time line of Chhoto Amra reveals that high yielding paddy variety (HYV - Lal Swarna and Lalat) was introduced in the year of 2006 along with chemical plant nutrients. The respondent expressed that though the productivity has increased (average 15 mnds / bigha i.e 33dec. for Lal Swarna) the cost of cultivation has

gone high and continuously rising day by day. They also noticed that pest attack is now more in High Yield Variety crops than earlier.

Palash, ber, kusum, neem, arjun, bahera, peepal, jackfruit, mango, sajne, bamboo bushes etc are common. During transect exercise, the respondent expressed that Mahul and Saal trees are disappearing gradually. Few herbs locally known as 'Chekundi', 'Khapra', 'Garundi' have, as they noticed, totally vanished. 'Hurhuri' and many other herbs, they added, are very rare today.

**Live stock:** Livestock rearing is a common practice of tribal community especially in drought prone areas. In Chhoto Amra village, almost each and every household (HH) engage themselves in activities like poultry, goatery or piggery etc.

**Off farm activities:** Lac cultivation is considered to be a complimentary and supplementary form of income to the existing livelihood activities of Chhoto Amra people. Though three major lac host trees namely palas, ber and kusum are available in plenty, the production has conventionally been confined to these areas.

**VILLAGE:** HATIDUBA

**BLOCK:** TAMULPUR

**DISTRICT:** BAKSA

**STATE:** ASSAM

**Hatiduba** is a small village of Baksa district of Assam state, bounded by Bhutan in north, Udalgiri

Jharkhand state.

**Occupation** (Number of Households)

**Cultivator:** 49;

**Daily wage labour:** 47 and **Business:** 4

**Primary School:** 1; **Anganwadi:** 1;

**Market:** Daily Market at Baro Amra and weekly at Baro Kocha.

**Post office:** Chouka

**Bank:** Gorangkoncha

**Communication:** Nearest bus stop at Chouka on National High way (NH 33).

**SHG:** 2 (Women)

**Youth Club:** 1 (mainly associated with football)

**Drinking water:** Tube well: 7 nos. Water level goes down during dry season.

**Fuel wood:** Collected from forest adjacent to village during dry period.

**Fodder:** As such there is no grazing land in the village. After paddy harvest, cattle graze on crop land.

During crop growing period, a shift to dungri / upland was observed. Agriculture practiced is mostly mono cropped Aman Paddy. Near river Kharkai (Northern part of the village) and 'Lal Bandh' pond, few patches of winter crops like mustard, tisi [linseed], wheat, lentils and vegetables are grown.

Chhoto Amra village people are still growing a number of traditional paddy varieties. These are Saalphul, Bachakalma etc for low land (Bohal); and Asonlaya, Kaya, Gerimalot for upland (Baid).



district in the east, Barpeta, Nalbari and Kamrup districts in the south and Chirang district in the west. Mashalpur town is the headquarters of the district.

**Rainfall and Climate:** The district enjoys a sub-tropical humid climate with hot summer and moderate winter. January is the coldest month and July/August is the warmest month. The winter temperature drops to 10°C and summer temperature goes up to 35°C. South-West monsoon activates from June and continues up to September-October. The average annual rainfall of the district is about 3000 mm.

**Geomorphology and Soil:** The district forms a part of the vast alluvial range of Brahmaputra River system. Soil varies from sandy to silty loam, or clayey loam. The variation in composition is mainly due to the varying composition of the river borne materials deposited at different times and under different conditions.

In general, the soil is acidic to slight alkaline in nature and is moderately permeable and characterized by the presence of low organic carbon and low soluble salts.

From agricultural point of view, the soil in major parts of the district is suitable for all sorts of crops.

Floods devastate the district regularly during the monsoon season. Flood accompanied with

soil erosion and sand deposition causes maximum damage to standing crops of the agricultural lands.

**Occupation** (Number of Households)

**Cultivator:** 50;

**Daily wage labour:** 70 and **Business:** 11

**Primary School:** 1; **Anganwari:** 1;

**Market:** Daily Market at Darang Mela 2 km away from the village, and weekly market at Parkijuli 4 km

**Post office:** at Darrang Mela,

**Bank:** State Bank of India 2 km,

**Communication:** Bus stop at Darrang Mela (2 Km), on Rangia Bhutan National High way.

**SHG:** 2 (Women) **Youth Club:** 1 'Dong'

**Management Committee:** 1

**Drinking water:** Dug well & bore well (3 Borings: one at village entrance- 220 feet depth, one at the middle of the village with 200 feet depth and one near school with 140 feet depth); but not yet functioning and pipe line water supply with very little discharge. Dug wells nearly dries up during summer period. About 30 HHs of Southern part of Hatiduba collect water from Santipur village (2 km). It takes about 2 hours due to long queue. Others depend on dug well and pipe line water supply. Some use bicycle to carry drinking water from Sasipur (2.5 km).

**Fuel:** Fuel wood is locally collected. During rainy season there is a great problem to procure them.

**Fodder:** As such no grazing land is there. After

## DEMOGRAPHY

Village	HH No.				Literacy%		Drop out %	APL %	BPL %	No Card %	Landless %
	Total	SC	ST	OBC	Male	Female					
Hatiduba	131	2	18	111	70	30	12	8	25	67	(57)



paddy harvest, cattle graze on crop land. It is a problem during rest of the period.

**Agriculture:** Mostly mono cropped Aman Paddy is found. Few patches are grown with winter crops depending on availability of irrigation. Betel nut and coconut are very common in every household. Fruit trees like mango, jackfruit, jujube etc are also common. Besides, bamboo bush, simul, kala sirige, pani gamar and various shrubs /herbs like kutush,

vat vangri, rendoi and sitapan (a medicinal plant) are found. Few edible and medicinal herbs, they noticed, have totally disappeared from the area. Though the research team had experienced growing of hybrid paddy, the Hatiduba village people still continue to grow a number of traditional paddy varieties. Usually they are not habituated with chemical farming. Practically, there is no use of pesticides or herbicides.

## RESEARCH FINDINGS

### UNDERSTANDING THE PERCEIVED AND FELT 'CHANGES' AT COMMUNITY LEVEL

The elderly people of Chhoto Amra village do believe that if there is 'Nagpuria howya' before on set of monsoon, the crop yield (paddy) will be better. On query, the respondent clarified that the term 'Nagpuria howya' means a hot wave from Nagpur side i.e. from south-west side of the village.

Few village weather predictors shared their observations very confidently that the summer temperature has increased too high over the last two decades and the cold spell has shortened significantly which hampers winter crops. The winter temperature is no more pinching as earlier. Overall, they collectively concluded 'the weather has adversely changed'. A number of crop varieties have lost because of the climate change. Moreover, they added, 'a wide range of flora and fauna in jungles are no more existing today. We the tribal people, primarily forest dwellers are now in great threat'.

### IMPACT ASSESSMENT

#### Impact of climate change on livelihood

In fact, there is no exact area specific value for damages caused on livelihood by past climate related events. Subjective evidences have been retrieved through various PRA tools and focus group discussions. The available agricultural facts indicate 'climate change' is posing threat on their livelihood and consequently affecting their socio-economic conditions. Moreover, people are forced to migrate or be involved in other non agricultural job like stone crushing especially women folk in both the villages which is hazardous for their health.

#### Impact of climate change on crop cultivation and livestock rearing

During continuous dry spell or delayed monsoons, land becomes dry and difficult to plough. Also lack of /or late precipitation delays sowing time, hampering crop growth resulting in poor harvest. Dry spells during crop period, as respondents expressed, causes total crop failure. Even a fortnight delay in onset of monsoon is found to have a significant difference in crop yield thus leading to deprivation of households' livelihood.

Poor precipitation has led to poor grass regeneration / forage deficit, water shortage and heat stress on livestock, consequently increasing the mortality of livestock.

#### Impact of climate change on women

Women are more vulnerable to climate change, as noticed by the villagers, compared to men. In addition to daily routine work at home, women have to travel a long distance to fetch drinking water, firewood collection etc. As the ground water level gradually goes down due to climate change, nearby forests have also degraded. The poor





nutritional status particularly in Hatiduba village is a warning.

#### **Impact of climate change on children**

While interacting with the focus group, it was revealed that children (of both the study areas) are affected by climate change. Vulnerability of children is apparent from malnutrition, drop-outs and poor academic achievements. The children, irrespective of gender, are forced to engage themselves in various activities, either to earn cash or to support their parents.

#### **Impact of climate change on other livelihood activities**

Natural resource based livelihood activities are



now in great danger. For example, in Chhoto Amra village lac cultivation has an immense opportunity to fetch good returns. Unfortunately, change in rainfall pattern and heat waves hinder the scope. Moreover, since last few years, the illegal 'pathar khadan' (stone crushers) are sprouting around the locality. The atmosphere is full of stone dust. The villagers expressed that a thin layer of dust may have coated on lac-organism colony which has affected the lac production considerably.

Bamboo is one of the most important input in rural life. The bamboo bushes on western side of the village (Hatiduba) are wilting due to poor soil moisture. Like bamboo, other shallow rooted tree species are suffering from the same problem, which indicates that ground water has now gone beyond plant root zone.

#### **Coping mechanism (at community level through self initiative and extension support).**

**Community Initiatives:** The research team

experienced an unique example at Hatiduba village regarding improvement of irrigation system. 'Dong' a community managed irrigation system has been working since long back. It is a traditional practice of irrigation in the locality. The nullas are made across the crop field. Water is driven from reservoir (Dam) located at India Bhutan border area. One can irrigate his or her plot as needed. Beneficiaries are responsible to repair/maintain the nullas when needed. It's a mandatory assignment for beneficiaries under the guidance of 'Dong' committee.

**Group/ individual initiatives:** Chhoto Amra village people have prepared water-outlets (like switch gate) at 'Lalbandh' pond (a common



village property). The monsoon rain is directed to 'Lalbandh' pond. Vast areas of cropped land as well as other domestic purposes are served by the 'Lalbandh' pond.

**Self/Individual initiatives:** 2nd cropping by using residual moisture. Using drought tolerant crop varieties like lentils, mustard, linseed and

vegetables etc.

**Extension/External support:** Excavation or re-excavation of ponds, in case of Chhoto Amra village has been done by block / NGO initiatives. New crop variety has also been introduced by TRCSC at Chhoto Amra village. Trials on SRI (System of Rice Intensification) have been

conducted at Hatiduba and Chhoto Amra by GVM and TRCSC respectively, both the organisations are partners under the IGSSS livelihood program, People's Empowerment for Accessing Rights to Livelihood. Awareness programme and trainings are also conducted by them to explore the opportunities and thus cope with the situations.

## ACTION PLAN

In the light of climate change, several issues and challenges need to be prioritized considering the strength and weakness of the communities. Analyzing the local situation, the action plan is designed.

Basically the idea is to allow the mechanism in the direction of low emission of green house gases (GHG) or less "carbon intensive" approaches which

are eventually responsible for climate change.

Emphasis was given more on two major aspects i.e. i) Carbon offset credits: clean form of energy (renewable energy) production and ii) Carbon reduction credits: collection and storage of carbon from our atmosphere through bio-sequestration (reforestation, forestation).

### 1. THRUST AREA: Integrated Farming

Goals	Issues identified	Action plan for adaptation and mitigation measures
Sustainable Livelihood Food security	<ul style="list-style-type: none"><li>• Rainfall unpredicted; Rainy days decreased, results erratic rain; drought /water stress. Flood/inundation.</li></ul>	<ul style="list-style-type: none"><li>▶ Adaptive trial on crop / livestock management</li><li>▶ Trial on SRI for low emission of Methane gas (CH<sub>4</sub>).</li><li>▶ Introduction / reintroduction of tradition crop/ varieties.</li></ul>
Availability of fodder	<ul style="list-style-type: none"><li>• Temperature rises</li></ul>	<ul style="list-style-type: none"><li>▶ Inter/mixed/relay cropping</li></ul>
Availability of fire wood	<ul style="list-style-type: none"><li>• Depletion of ground water, water bodies dry up.</li><li>• Soil erosion; poor soil fertility;</li><li>• Convergence of bio diversity</li><li>• No / less availability of quality seed</li><li>• Inappropriate crop / livestock species</li><li>• Diseases / pest attack</li><li>• Shortage of animal fodder</li><li>• Lack of technical knowledge/ support</li></ul>	<ul style="list-style-type: none"><li>▶ Appropriate crop rotation (preferably with one legume crop)</li><li>▶ Quality seed production and preservation.</li><li>▶ Promoting strategic crop varieties.</li><li>▶ Use of organic matter for enhancing soil moisture retention capacity.</li><li>▶ Practice of mulching.</li><li>▶ Awareness on organic plant nutrient and bio- pesticides and its use.</li><li>▶ Generation / re generation of grazing land/</li><li>▶ Need based training</li></ul>



## 2. THRUST AREA: Soil and Water Conservation

Goals	Issues identified	Action plan for adaptation and mitigation measures
Conservation of soil and water Assured irrigation Availability of drinking water	<ul style="list-style-type: none"><li>• Deforestation</li><li>• Soil erosion</li><li>• Depletion of ground water</li><li>• Degradation of soil</li></ul>	<ul style="list-style-type: none"><li>▶ Identification of micro watershed zone and reserving of maximum precipitation (of catchment area).</li><li>▶ Excavation / re excavation of water bodies for harvesting of rainwater.</li><li>▶ Check dam using local resources like stone, log, mud etc.</li><li>▶ Earth work - It includes land shaping / contour or field bunding.</li><li>▶ 3-tire plantation /alley cropping/ growing drought tolerant crop varieties / cover crop for fodder or medicinal plants as suited.</li><li>▶ Re generation of forest (make it a 'food forest')</li><li>▶ Group base cultivation on fallow land.</li><li>▶ Need based training.</li></ul>

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## 3. THRUST AREA: Health and Hygiene

Goals	Issues identified	Action plan for adaptation and mitigation measures
Health and Hygiene Provision of balanced diet Sense of hygiene.	<ul style="list-style-type: none"><li>• Malnutrition</li><li>• Poor sanitation</li><li>• Lack of people's motivation</li></ul>	<ul style="list-style-type: none"><li>▶ Kitchen garden at every household to provide fresh and toxic free improved diet.</li><li>▶ Kitchen garden at school premises to supplement 'Midday meal'.</li><li>▶ More attention / monitoring of local support services.</li><li>▶ Awareness/Motivation camp to use low cast latrine particularly in Chhoto Amra.</li><li>▶ Organizing Vaccine / Immunization camp</li></ul>

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## 4. THRUST AREA: Alternative Income Generation

Goals	Issues identified	Action plan for adaptation and mitigation measures
Generating alternative income source Provision of job to landless households	<ul style="list-style-type: none"><li>• Landless households. (in case of Hatiduba)</li><li>• No or less job opportunity.</li><li>• Migration</li></ul>	<ul style="list-style-type: none"><li>▶ Lac cultivation (in Chhoto Amra)</li><li>▶ Fisheries</li><li>▶ Scope of floriculture at Chhoto Amra village</li><li>▶ Need based Training</li></ul>

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## 5. ACCESS TO COMMON PROPERTY RESOURCES (CPR)

Goals	Issues identified	Action plan for adaptation and mitigation measures
Access to Common Property Resources (CPR) by poor and marginal people	<ul style="list-style-type: none"><li>• Ignorance about village resources.</li><li>• CPR are kept idle</li></ul>	<ul style="list-style-type: none"><li>▶ Identification of CPRs.</li><li>▶ Use of CPRs by the poor and the marginal</li><li>▶ Plantation of Indigenous tree species on CPRs like village road side, school premises, holy places etc.</li><li>▶ Need based training.</li></ul>

## 6. THRUST AREA: Resource Conservation and Preservation

<b>Goals</b>	<b>Issues identified</b>	<b>Action plan for adaptation and mitigation measures</b>
Resource identification and preservation	<ul style="list-style-type: none"> <li>• Resource ignorance</li> <li>• No or less use of village resources</li> </ul> <p>Both the villages are rich in natural resources but people are not aware of that. Most of the land is kept fallow and are degraded over the period. These resources are:</p> <p>a) <b>Natural resources</b> (e.g. Forest, old tree, hill or mountain, lake, jhora (fountain etc. having wide range of bio diversity)</p> <p>b) <b>Human Resource</b> (i.e. village doctor, dai, good teacher, artisan, skilled cultivator/ Seed grower/weather predictor and so on.)</p>	<ul style="list-style-type: none"> <li>▶ Identifying and listing of village resources and updating those at regular interval at village level.</li> <li>▶ Action taken to preserve/protect those resources and ensure their judicial use.</li> <li>▶ Percolating traditional knowledge / wisdom by resource persons to interest people.</li> <li>▶ Arranging a 'story telling session' by elderly people to the village children.</li> </ul>

## 7. THRUST AREA: Disaster Proofing

<b>Goals</b>	<b>Issues identified</b>	<b>Action plan for adaptation and mitigation measures</b>
Disaster proofing	<ul style="list-style-type: none"> <li>• Lack of seeds while seedlings are damaged due to drought or flood.</li> <li>• Money lender</li> <li>• Poor access to credit facility</li> </ul>	<ul style="list-style-type: none"> <li>▶ Establishment of Community Seed Bank</li> <li>▶ Credit and savings group</li> <li>▶ Need based training</li> </ul>

## 8. THRUST AREA: Institutional Strengthening / Human Resource Development

<b>Goals</b>	<b>Issues identified</b>	<b>Action plan for adaptation and mitigation measures</b>
Institutional Strengthening / Human Resource Development	<ul style="list-style-type: none"> <li>• Lack of village institution</li> <li>• People are not aware of their 'rights'.</li> <li>• Child care is neglected.</li> <li>• Socially neglected.</li> <li>• Harassed and cheated by money lender.</li> <li>• Poor or no linkage with local government/ other institutes.</li> </ul>	<p>Identifying or setting up of Social Institute &amp; formation of Task Force Group for -</p> <p>i) Child care</p> <ul style="list-style-type: none"> <li>▶ Formation &amp; Supervision of crèche</li> <li>▶ Training of Teacher</li> </ul> <p>ii) Health and hygiene</p> <ul style="list-style-type: none"> <li>▶ Mother &amp; child care</li> <li>▶ Training of 'dhai'/bare-foot-doctor (both for human and animal)</li> </ul> <p>iii) Disaster mitigation &amp; preparedness</p> <ul style="list-style-type: none"> <li>▶ Training</li> <li>▶ Setting up of mini meteorological centre (at least having Rain gauge and maximum/minimum temperature thermometer).</li> </ul> <p>iv) Provision of Information to the community regarding Government programme/ scheme /circular or activities conducted by NGOs.</p> <p>v) Provision of social justice to the community.</p>



## GUIDING PRINCIPLES

The above action plan has been laid out on the basis of few 'guiding principles' which would be considered as mandatory. These include –

- Priority to group activity rather than individual efforts
- Revitalizing traditional knowledge / wisdom [learning from ITKs]
- Bio diversity conservation & eco-friendly approaches
- Avoiding 'high-tech' technology [based on fossil fuels etc]
- Mobilizing government and bank funds as well as group savings/donations
- No subsidy approach - Instead of 'grant', consider 'loan' (which must be refunded as cash or kinds) to group fund for future developmental works [group efforts valued as counterpart funding].

## REFERENCE

Impact of climate change on jharkhand agriculture:  
Mitigation and adoption A. Wadoodi and Pragyana Kumariz

Ground Water Information Booklet  
Baksa District, Assam, Technical Report Series: D, No: 18 /2008-09

Impact of climate change on extreme rainfall events and flood risk in India  
P Guhathakurta , O P Sreejith and P A Menon  
Indian Meteorological Department, Shivajinagar, Pune 411 005, India.  
e-mail: pguhathakurta@rediffmail.com

Water Stress Assessment in Jharkhand State Using Soil Data and GIS  
Moushumi Hazra; 2\*Kirti Avishek; 1Gopal Pathak; 2Nathawat, M S  
Environmental Science & Engineering, Birla Institute of Technology, Mesra, Ranchi-835215.Jharkhand,  
India 2 Department of Remote Sensing, Birla Institute of Technology, Mesra, Ranchi

Global climate efforts 'woeful' – UNDP Human Development Report 2006.  
<http://news.bbc.co.uk/2/hi/science/nature/6126242.stm>

## **CHHOTO AMRA TRANSECT**

### **Annexure I A**

**(From southern to northern part of the village. i.e hill area to Kharkai river bank)**

A team of 15 villagers along with TRCSC field personnel did the Transect exercise on 23rd March 2012.

#### **Observation**

**Soil:** Red lateritic, sandy loam to clay loam. The northern part of the village i.e. near river side soil varies from clay to sandy loam.

**Soil depth:** 1.5 to 2 feet

**Ownership:** Private.

**Irrigation:** Mostly rainfed. Very few patches (near river and pond) may have the facility if monsoon is adequate.

**Crop:** Paddy, maize, pigeon pea, gram, kurthi tishi, tomato, chilli, ladies finger, Ivy gourd, bittergourd, brinjal, etc.

**Vegetation:** Palash, ber (kul), neem, jackfruit, mango, sajne, saal, arjun, behera, gamar, aamra, koinar, bel, bamboo, peepal etc and putus, other herbs and shrubs.

**Limitation:** Soil erosion, low soil moisture, lack of irrigation. A patch is inundated when Chandil dam impounds water during Aman season.

**Opportunity:** Field bunding, excavation or re-excavation of tanks. Cover crop as pasture. For inundated patches – Flooded rice, winter crop as suited. If possible stagnant water may be used by water lifting devices to irrigate crop land.

## **HATIDUBA TRANSECT**

### **Annexure I B**

**(Transect walk from northern to southern part of the village)**

A team of 10 villagers along with GVM field personnel did the transect exercise. They started walking from northern side to southern side of the village.

#### **Observation**

**Soil:** Varies from silty loam to clay loam.

**Soil depth:** About 2 feet.

**Ownership:** Private

**Irrigation:** Rain fed and by 'Dong' a community managed irrigation system.

**Crop:** Mostly Paddy - Few vegetable patches near households – Tomato, bean.

**Vegetation:** Betel nut, coconut, mango, jackfruit, jujube, bamboo bush, simul, kala sirige, pani gamar and various shrubs /herbs like kutush, vat vangri, rendoi, sitapan (a medicinal plant).

**Limitation:** Soil erosion, low soil moisture, lack of irrigation.

**Opportunity:** Sasipur, Hatiduba and Santipur villages are associated with "5 No. Dong Committee". The Committee is looking after the whole situation April onwards. More attention would be given to regulate the switch gate so that the flow of water can be controlled at hill area (upper stream).

**SEASONALITY CHART OF CHHOTO AMRA**

**ANNEXURE II**

**Finding out the crisis period of the basic needs of livelihood at Chhoto Amra village.**

Issues	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Food								■				
Fodder										■		
Fuel									■			
Drinking water				■								

**TIME LINE CHHOTO AMRA  
ANNEXURE III**

**EVENTS**

Severe drought	1962
Primary School Started	1964
Bicycle entered in village	1969
Drought	1981
Singbhum was divided into East and West in the year of Subarnarekha Project Started	1982
Anganwadi Centre opened	1990
1st matric pass by Jogendra Majhi	1992
Entry of motor cycle	1994
PCC road formed	2004
Introduction of High Yielding Variety	2006
Smt. Basanti Majhi 1st lady to have passed matriculation	2007
Anganwadi Centre started its function	2008
PEARL Project started	2009
Introduction of 'SRI'	2011

**EFFECTS**

Crop damage. Livelihood affected. Dependence on forest produces.
Improvement of child education
Improved communication /transportation (first used by Chhotulal Majhi)
Agricultural operations got hampered. There were less job opportunities and as a result people were forced to migrate. Women did stone crushing job.
Self confidence.
Trend to faster life / modernization. Use of fossil fuel (1st Motor cycle purchased by Anil Ch. Majhi)
Road communication developed
Chemical intensive farming started Yield increased but cost of cultivation increased significantly.
Empowerment of women
Care of health and hygiene SSP (Siksha Se Paribartan) started
Better yield with less input

**General comments:** Change of Food habit– some food is missing like 'Mardhua' but respondent failed to recall the time. They also marked that availability of forest produce is gradually decreasing. Some tree species like 'kund' and 'piyal' no more exist in the forest.



**SEASONALITY CHART OF HATIDUBA**

Finding out the crisis period of the basic needs of livelihood at Hatiduba village.

Issues	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Food			■									
Fodder		■										
Fuel							■					
Drinking water	■											■

**TIME LINE HATIDUBA  
ANNEXURE IV**

**EVENTS**

Cholera as an epidemic.  
Severe attack of Gandhi bug in rice field  
Solar eclipse  
Malaria  
Rice crop damaged by Hispa pest  
Cyclone  
Poor Rainfall

1961  
1962  
1980  
1986  
1989  
1995  
2004

**EFFECTS**

12 villagers died.  
Rice production hampered significantly  
People scared; Cultural barrier  
Four people died  
Decreased rice production  
Loss of property – one died  
Less trees, poor cultivation leading to decreased production.

Flash flood

2008

Shortage of drinking water.  
soil erosion, trees washed out.  
Cracking of dug well wall.

Earth quake

Drought

2011

Paddy growing area kept fallow.  
Non-availability of jobs in village,  
as a result of which the poorer section  
of the society migrated to other places  
in search of work.







