

**PREPARATION OF DPRS FOR ASSESSMENT OF SOIL  
EROSION, ITS NATURE AND EXTENT AND SUITABLE  
CONTROL MEASURES FOR SEVEN DISTRICTS OF  
ASSAM VIZ. DHEMAJI, DIBRUGARH, GOALPARA,  
JORHAT, KAMRUP, NALBARI AND SONITPUR**



**2004**

**SUBMITTED BY:**

**NERIWALM, TEZPUR**

**TITLE OF THE STUDY**  
DPR FOR ASSESMENT OF SOIL EROSION,ITS NATURE & EXTENT & SUITABLE CONTROL  
MEASURES FOR DHEMAJI,DIBRUGARH,JORHAT,KAMRUP,NALBARI & SONITPUR

**1.DHEMAJI**

***EXECUTIVE SUMMARY***

*This detailed project report (DPR) is the outcome of the study conducted by North Eastern Regional Institute of Water and Land Management (NERIWALM), Tezpur. In this connection, all the field data were provided by the Divisional Officer, Dhemaji district, Soil Conservation Department, Govt. of Assam. The data submitted by the department were analyzed at NERIWALM and this DPR has been prepared for work implementation in the district to tackle the soil erosion problem. Qualitative improvement of soil erosion and management of water and its conservation is the ultimate goal of this DPR.*

*The DPR is divided into seven chapters. In this volume the geographical setting of the study area, nature and extent of soil erosion, suitable control measures for soil erosion and water conservation, cost estimation and benefit-cost analysis, suggestions for soil and water conservation extension and the suggestions for project implementation along with the conclusions are included. In this DPR suitable conservation measures indicating activities to be taken up are also given.*

*This study revealed that soil erosion is an acute problem in different parts of the district. Erosion in the valley area is more due to biotic interference in the catchment area of the rivers originating from Arunachal Hills. This should be minimized and controlled through co-ordinated actions, as it is a regional issue. Large areas are under active degradation due to the erosion hazard in recent times. The soil erosion problem has deleterious impact on the agriculture, economy and environment of the district. Qualitative study of soil erosion, its nature and extent has been conducted for the district. The major causes of soil erosion identified in the district are: (i) River bank erosion of six rivers viz. Brahmaputra, Subonsiri, Jiadhal, Gainadi Simen and Dikrai and some other small rivers. Most of the rivers originated from Arunachal hills flowing southwards and ultimately fall in Brahmaputra River. ii) Sheet erosion due to reduction of vegetation cover in the river catchment and foothill areas iii) Land degradation due to water logging/drainage congestion in the low lying areas iv) Flood inundation. No typical gully formation or gully erosion is observed in the district. However, some small nalla/streams are causing erosion in agricultural land.*

The major drainage lines of the district are identified. Most of the drainage lines are perennial in nature. To prepare a comprehensive plan for soil and water conservation for the district, the district area is delineated into smaller units of watershed and sub watershed. The specific erosion problems of the district are identified and management plan has been prepared for erosion control and water conservation.

The suitable control measures suggested for the district are 1. Earthen drainage channel, 2. Earthen ring bund cum road, 3. Water harvesting tank cum Fish pond, 4. Demonstration of new and sustainable technologies, 5. Soil plantation, 6. Block plantation, 7. Drainage line treatment by vegetative measures, 8. River training and bank protection work, 9. Brush wood dam, 10. Protective afforestation, 11. Sluice gate, 12. Horticultural plantation, 13. Roadside plantation, 14. Natural water body development for pisciculture and recreation, 15. Nalla bund/Check bund. Besides these methods some traditional techniques of soil and water conservation may be very effective and suitable for local conditions. Therefore, such techniques are also suggested to take up.

Improper drainage and water logging is a common scene in many villages of the district in rainy season. Scientific drainage system may be provided to overcome this problem and for this purpose earthen drainage channels are suggested.

The flood inundation is also one of the major problems for crop cultivation and a major cause of land degradation in the district. To save a vast areas of land from flood inundation and land degradation earthen ring bund may be taken up. The bunds will serve as connecting road to the villages/farm road also.

The water harvesting may be done in different forms like rainwater harvesting, in-situ harvesting in field, run off harvesting, direct harvesting in ponds in farmers' field etc. which may create a huge water spread area in the district. This activity could promote pisciculture, duck rearing in addition to agriculture. Thus water harvesting and its management for various uses are given equal emphasis as erosion control. Considering the vast scope suitable areas are suggested for water harvesting cum fishery development in the district. Pisciculture will be an additional feature in the water harvesting

structures. Recreational facilities could also be created. This will create self employment for the people and help in economic growth of the district.

Due emphasis is given on demonstration of new and sustainable technologies for agricultural and horticultural crops. These are suggested for on-farm water management, flood-resistant short duration varieties, Integrated Pest Management (IPM), Integrated Plant Nutrient Management (IPNM), diversification of farming system, organic farming, use of bio-fertilizers, multiple cropping, improved inter cropping, value added agriculture and marketing of produce etc. Alternate land use systems like agro-forestry, agri-horticulture etc. may be tested. For this purpose some selected plots of land in different places of the district are suggested to utilize.

The som plantation is meant to promote sericulture in the district. The climate of the district is also suitable for som plantation. Suitable land may be covered by this plantation which will help in soil and water conservation, increase infiltration, decrease overland flow expand the sericulture activity and ultimately improve socio-economic condition of the people of the district.

Community lands (i.e. the land within the school boundaries, namghar etc.) may be covered by block plantation. Species like Sissoo, Simul, Casuarina species, fruit trees like Guava, Jackfruit etc are suggested to consider under this plantation.

For erosion caused by small drainage lines treatment by vegetative measures is suggested. Grass species like citronella, vetivar grass etc. are suitable for this purpose. Species like 'Arahar' can be grown in rows in between the grass plantations. This will yield economic benefit also.

River bank erosion is one of the major erosion problems of the district. Bank erosion caused by rivers like Brahmaputra, Subansiri, Jiadhal, Gainadi etc. can be protected by Bamboo pallasiding, Bamboo cribs and timber spur in some of the specific locations to save agricultural field. Some areas of the district are under active degradation due to river erosion. It is proposed to use Bamboo pallasiding, Bamboo cribs for river training works in the affected areas.

In some of the areas of the district water comes from high land and suddenly drops at low-lying agricultural fields. In this type of water drops soil erosion is very high. This type of water erosion could be checked by using

timber, local bhaluka bamboo etc. To tackle this type of situation in different places of the district brush wood dams are suggested.

Sheet erosion and rill erosion in the catchment areas of rivers, foothill areas and in riverbank areas are also significant soil erosion issues in the district. It is also a common scene in all wastelands where vegetative cover is very less. Vast areas are lying unused or fallow along the rivers, specially in the recent alluvial deposition areas. These areas may be considered for protective afforestation.

The natural discharge from an area could not be prevented but at the same time it is required to prevent the inflow of water also. To tackle this type of situation, sluice gate is considered to be the most appropriate measure. For this purpose sluice gates are suggested in the district.

Adoption of Horticulture, Forestry and Medicinal plants are essential both for economic and ecological reasons. The horticultural crops like orange, citrus, pineapple, banana, guava, coconut etc., medicinal plants like amla, hartaki, neem etc. are grown in some parts of the district. These plantation also have long-term impact in improving the micro-climate and re-distribute nutrients from lower layers of soils and restore ecological balance. These crops may be cultivated in large-scale at all suitable areas of the district.

The plantation activity in the district is suggested for roadsides also. For the road side plantation, the tree species suggested are sissoo, simul, gomari, fruit trees like jackfruit, olive etc., medicinal plants like neem, amla etc. ornamental plant like debdaru, nahar etc. These trees can yield good economic benefit, improve aesthetic beauty of the area and will also improve environmental quality.

Suggestions are given to improve the productivity of inland fisheries using 'Beels' that have been in existence from historical times like 'Bordoloni'. Water conservation/harvesting, pisciculture, irrigation to the water scarcity areas by using low lift pumps, creation of recreational facilities are some of its multipurpose uses.

Though there is no typical gully erosion in the district, some nalla/streams are causing erosion in agricultural land. Nalla bund or check bund may be used to check erosion and for water conservation very effectively

*in small streams of the district. For this purpose nalla bund/check bund are suggested.*

*It is also suggested to establish extension services for soil and water conservation in the district, which is still lacking in the state. This will create awareness and will increase involvement of farmers in checking erosion. Local governing bodies, NGOs and other institutional arrangements should be involved in creating awareness among the farmers.*

*Model estimates for different types of erosion control and water conservation measures are prepared using the specification emerged out of the studies and designs. Based on the number of structures of different kinds the total cost for the proposed conservation measures for the district has been worked out. The project cost for the development components has been estimated as **20,00.00 lakhs (twenty crores)** only.*

*On commencement of the project further specific surveys may become necessary. 5% of the cost of development activities may be provided for surveys and estimate preparation for sanctioning within the departments.*

*Again, 5% of the development cost may be provided for conducting workshop & training for departmental officers/staff for project implementation, awareness/community mobilization programme, extension activities and monitoring and evaluation of the project. Cost for pre-project benchmark surveys, mid term evaluation, post project assessment, environmental audit by independent agencies are also form part of the project.*

*10% of the cost towards development components may be provided as administration cost to meet the expenditure on salary, wages, and other office expenses.*

*The total project cost (including 20% of cost for development component as management component) for the district has been estimated as **24,00.00 lakhs, (twenty four crores)** only. Five years period is suggested for project implementation in phased manner.*

Date: 31.03.2009  
Place: Tezpur, Assam

Sd/-  
**Dr. S. C. Patra**  
Director, NERIWALM

## 2. DIBRUGARH

### EXECUTIVE SUMMARY

This detailed project report (DPR) is the outcome of the study conducted by North Eastern Regional Institute of Water and Land Management (NERIWALM), Tezpur. In this connection, all the field data were provided by the Divisional Officer, Dibrugarh district, Soil Conservation Department, Govt. of Assam. The data submitted by the department were analyzed at NERIWALM and this DPR has been prepared for work implementation in the district to tackle the soil erosion problem. Qualitative improvement of soil erosion and management of water conservation is the ultimate goal of this DPR.

The DPR is divided into seven chapters. In this volume the geographical setting of the study area, nature and extent of soil erosion, suitable control measures for soil erosion and water conservation, cost estimation and benefit-cost analysis, suggestions for soil and water conservation extension and the suggestions for project implementation along with the conclusions are included.

This study revealed that soil erosion is an acute problem in different parts of the district. Erosion in the valley area is more due to biotic interference in the catchment area of the rivers, which should be minimized and controlled. Co-ordinated action is required to the specific regional erosion issues of the district. Large areas are under active degradation due to the erosion hazard in recent times. The soil erosion problem has deleterious impact on the agriculture, economy and environment of the district. Qualitative study of soil erosion, its nature and extent has been conducted for the district. The major causes of soil erosion identified in the district are: (i) riverbank erosion of six major rivers viz. Buridihing, Dibru, Brahmaputra, Sessa, Dimow and Diroi rivers, (ii) sheet erosion due to reduction of vegetative cover, (iii) land degradation due to water logging/drainage congestion and (iv) flood inundation. Suitable erosion control measures have been suggested in the DPR. No typical gully formation or gully erosion is observed in the district. However, some small nalla/streams are causing erosion in agricultural land.

The drainage lines of the district are identified. Thirty one drainage lines are found in the district, including the river Brahmaputra. All the drainage lines are perennial in nature. To prepare a comprehensive plan for soil and water conservation for the district, the district area is delineated into smaller units of watershed and sub watershed. The district area is divided into 31 major watersheds/basins. Again, the 31 major watersheds/basins are subdivided into 495 micro-watersheds/micro-basins of area around 500 ha. The specific erosion problems of micro-watersheds are identified and management plan has been prepared for erosion control and water conservation.

The suitable control measures suggested for the district are 1. Earthen drainage channel, 2. Earthen ring bund cum road, 3. Water harvesting tank cum Fish pond, 4. Demonstration of new and sustainable technologies, 5. Soil plantation, 6. Block plantation, 7. Drainage line treatment by vegetative measures, 8. River training and bank protection work, 9. Brush wood dam, 10. Protective afforestation, 11. Sluice gate, 12. Horticultural plantation, 13. Roadside plantation, 14. Natural water body development for pisciculture and recreation, 15. Nalla bund/Check bund. Besides

these methods some traditional techniques of soil and water conservation may be very effective and suitable for local conditions, therefore, suggested to take up.

Improper drainage and water logging is a common scene in almost all the villages of the district in rainy season specially in the areas of Oufolia, Tingkhong, Dighalia, Ghugulani, Bhalukani, Jokai, Dihing Thekerani, Borbil, Kowar gaon. Scientific drainage system may be provided to overcome this problem and for this purpose 20,700 metres of earthen drainage channels are suggested.

The flood inundation is also one of the major problems for crop cultivation and a major cause of land degradation in the district. To save a vast areas of land from flood inundation and land degradation; 12500 metre of earthen ring bund may be taken up, which will serve as connecting road also.

The water harvesting may be done in different forms like rainwater harvesting, insitu harvesting in field, run off harvesting, direct harvesting in ponds in farmers' field etc. which may create a huge water spread area in the district. This activity could promote pisciculture, duck rearing in addition to agriculture. Thus water harvesting and its management for various uses are given equal emphasis as erosion control. Considering the vast scope an area of 3.5 ha is suggested for water harvesting cum fishery development in the district. Pisciculture will be an additional feature in the water harvesting structures. Recreational facilities could also be created. This will create self employment for the people and help in economic growth of the district.

Due emphasis is given on demonstration of new and sustainable technologies for agricultural and horticultural crops. These are suggested for on-farm water management, flood-resistant short duration varieties, Integrated Pest Management (IPM), Integrated Plant Nutrient Management (IPNM), diversification of farming system, organic farming, use of bio-fertilizers, multiple cropping, improved inter cropping, value added agriculture and marketing of produce etc. Alternate land use systems like agro-forestry, agri-horticulture etc. may be tested. For this purpose 16 ha of land in different places of the district are suggested to utilize.

The som plantation is meant to promote sericulture in the district. The climate of the district is also suitable for som plantation. 19 ha of land may be covered by this plantation which will help in soil and water conservation, increase infiltration, decrease overland flow expand the sericulture activity and ultimately improve socio-economic condition of the people of the district.

Community lands (i.e. the land within the school boundaries, namghar etc.) may be covered by block plantation. Species like Sissoo, Simul, Casuarina species, fruit trees like Guava, Jackfruit etc are suggested to consider covering an area of 9.5 ha. for this purpose.

For erosion caused by small drainage lines treatment by vegetative measures is suggested. Grass species like citronella, vetivar grass etc. are suitable for this purpose. Species like 'Arahar' can be grown in rows in between the grass plantation covering a total of 4000 metres of drainage line. This will yield economic benefit also.

River bank erosion is one of the major erosion problems of the district. Bank erosion caused by rivers like Buridihing, Dibur, Sessa etc. can be protected by Bamboo pallasiding, Bamboo cribs and timber spur in some of the



specific locations to save agricultural field. Sessa Napali, Jokai, Kutuha, Rohmohia are some of the areas which are under active degradation of Buridihing river erosion. It is proposed to use 150 nos. Bamboo pallasiding, Bamboo cribs for river training works in the affected areas.

In some of the areas of the district water comes from high land and suddenly drops at low-lying agricultural fields. In this type of water drops soil erosion is very high. This type of water erosion could be checked by using timber, local bhaluka bamboo etc. To tackle this type of situation in different places of the district 70 nos. of brush wood dams are suggested.

Sheet erosion and rill erosion in the riverbank are also significant soil erosion issues in the district. It is also a common scene in all wastelands where vegetative cover is very less e.g. Hatibandha area. Vast areas are lying unused or fallow along the rivers, specially in the recent alluvial deposition areas. These areas may be considered for protective afforestation. An area of 100 ha land is suggested to cover by this measure in the district.

The natural discharge from an area could not be prevented but at the same time it is required to prevent the inflow of water also. To tackle this type of situation, sluice gate is considered to be the most appropriate measure. For this purpose 08 nos. of sluice gates are suggested in the district out of which 4 nos in Verbandha area and 4 nos. in Ghugulani-Bhalukani area.

Adoption of Horticulture and Forestry are essential both for economic and ecological reasons. The horticultural crops like orange, citrus, pineapple, banana, guava, coconut etc. are grown in some parts of the district. These plantation also have long-term impact in improving the micro-climate and re-distribute nutrients from lower layers of soils and restore ecological balance. These crops may be cultivated in large-scale at all suitable areas of the district covering an area of 3.5 ha.

The plantation activity in the district is suggested for roadsides also. For the road side plantation, the tree species suggested are sissoo, simul, gomari, fruit trees like jackfruit, olive etc., medicinal plants like neem, amla etc. ornamental plant like debdaru, nahar etc. These trees can yield good economic benefit, improve aesthetic beauty of the area and will also improve environmental quality. It is planned to cover 5000 metres of length on both the sides of roads where plantation is sparse in the district.

Suggestions are given to improve the productivity of inland fisheries using 'Beels' that have been in existence from historical times. Borbeel, Dihing- Thekerani, Jokai beel, Merbeel etc are may be considered covering an area of 69 ha. Water conservation/harvesting, pisciculture, irrigation to the water scarcity areas by using low lift pumps, creation of recreational facilities are some of its multipurpose uses.

Though there is no typical gully erosion in the district, some nalla/streams are causing erosion in agricultural land. Nalla bund or checkbund may be used to check erosion and for water conservation very effectively in small streams of the district. For this purpose 4000 metres of nalla bund/check bund are suggested.

It is also suggested to establish extension services for soil and water conservation in the district, which is still

lacking in the state. This will create awareness and will increase involvement of farmers in checking erosion. Local governing bodies, NGOs and other institutional arrangements should be involved in creating awareness among the farmers.

Model estimates for different types of erosion control and water conservation measures are prepared using the specification emerged out of the studies and designs. Based on the number of structures of different kinds the total cost for the proposed conservation measures for the district has been worked out. The project cost for the development components has been estimated as 27,32.49 lakhs (twenty seven crores, thirty two lakhs and forty nine thousand) only.

On commencement of the project further specific surveys may become necessary. 5% of the cost of development activities may be provided for surveys and estimate preparation for sanctioning within the departments.

Again, 5% of the development cost may be provided for conducting workshop & training for departmental officers/staff for project implementation, awareness/community mobilization programme, extension activities and monitoring and evaluation of the project. Cost for pre-project benchmark surveys, mid term evaluation, post project assessment, environmental audit by independent agencies are also form part of the project.

10% of the cost towards development components may be provided as administration cost to meet the expenditure on salary, wages, and other office expenses.

The total project cost (including 20% of cost for development component as management component) for the district has been estimated as **32,79.00 lakhs, (thirty two crores, seventy nine lakhs)** only. Five years period is suggested for project implementation in phased manner.

Sd/-

Date: 16.09.2005  
Place: Tezpur, Assam

**Dr. S. C. Patra**  
Director, NERIWALM

## ***EXECUTIVE SUMMARY***

*This detailed project report (DPR) is the outcome of the study conducted by North Eastern Regional Institute of Water and Land Management (NERIWALM), Tezpur. In this connection, all the field data were provided by the Divisional Officer, Jorhat district, Soil Conservation Department, Govt. of Assam. The data submitted by the department were analyzed at NERIWALM and this DPR has been prepared for work implementation in the district to tackle the soil erosion problem. Qualitative improvement of soil erosion and management of water and its conservation is the ultimate goal of this DPR.*

*The DPR is divided into seven chapters. In this volume the geographical setting of the study area, nature and extent of soil erosion, suitable control measures for soil erosion and water conservation, cost estimation and benefit-cost analysis, suggestions for soil and water conservation extension and the suggestions for project implementation along with the conclusions are included. In this DPR suitable conservation measures indicating activities to be taken up are also given.*

*This study revealed that soil erosion is an acute problem in different parts of the district. Erosion in the valley area is more due to biotic interference in the catchment area of the rivers, which should be minimized and controlled. Co-ordinated action is required to the specific regional erosion issues of the district. Large areas are under active degradation due to the erosion hazard in recent times. The soil erosion problem has deleterious impact on the agriculture, economy and environment of the district. Qualitative study of soil erosion, its nature and extent has been conducted for the district. The major causes of soil erosion identified in the district are: (i) River bank erosion of four rivers viz. Brahmaputra, Bhogdoi, Disoi and Jhanji and some other small rivers. Most of the rivers originated from Nagafoothills flowing northwards and ultimately fall in Brahmaputra River. ii) Sheet erosion due to reduction of vegetation cover in the foot hill areas iii) Land degradation due to water logging/drainage congestion in the low lying areas iv) Flood inundation. No typical gully formation or gully erosion is observed in the district. However, some small nalla/streams are causing erosion in agricultural land.*

*The major drainage lines of the district are identified. Most of the drainage lines are perennial in nature. To prepare a comprehensive plan for*

soil and water conservation for the district, the district area is delineated into smaller units of watershed and sub watershed. The specific erosion problems of the district are identified and management plan has been prepared for erosion control and water conservation.

The suitable control measures suggested for the district are 1. Earthen drainage channel, 2. Earthen ring bund cum road, 3. Water harvesting tank cum Fish pond, 4. Demonstration of new and sustainable technologies, 5. Som plantation, 6. Block plantation, 7. Drainage line treatment by vegetative measures, 8. River training and bank protection work, 9. Brush wood dam, 10. Protective afforestation, 11. Sluice gate, 12. Horticultural plantation, 13. Roadside plantation, 14. Natural water body development for pisciculture and recreation, 15. Nalla bund/Check bund. Besides these methods some traditional techniques of soil and water conservation may be very effective and suitable for local conditions. Therefore, such techniques are also suggested to take up.

Improper drainage and water logging is a common scene in many villages of the district in rainy season. Scientific drainage system may be provided to overcome this problem and for this purpose earthen drainage channels are suggested.

The flood inundation is also one of the major problems for crop cultivation and a major cause of land degradation in the district. To save a vast areas of land from flood inundation and land degradation earthen ring bund may be taken up. The bunds will serve as connecting road to the villages/farm road also.

The water harvesting may be done in different forms like rainwater harvesting, insitu harvesting in field, run off harvesting, direct harvesting in ponds in farmers' field etc. which may create a huge water spread area in the district. This activity could promote pisciculture, duck rearing in addition to agriculture. Thus water harvesting and its management for various uses are given equal emphasis as erosion control. Considering the vast scope suitable areas are suggested for water harvesting cum fishery development in the district. Pisciculture will be an additional feature in the water harvesting structures. Recreational facilities could also be created. This will create self employment for the people and help in economic growth of the district.

*Due emphasis is given on demonstration of new and sustainable technologies for agricultural and horticultural crops. These are suggested for on-farm water management, flood-resistant short duration varieties, Integrated Pest Management (IPM), Integrated Plant Nutrient Management (IPNM), diversification of farming system, organic farming, use of bio-fertilizers, multiple cropping, improved inter cropping, value added agriculture and marketing of produce etc. Alternate land use systems like agro-forestry, agri-horticulture etc. may be tested. For this purpose some selected plots of land in different places of the district are suggested to utilize.*

*The som plantation is meant to promote sericulture in the district. The climate of the district is also suitable for som plantation. Suitable land may be covered by this plantation which will help in soil and water conservation, increase infiltration, decrease overland flow expand the sericulture activity and ultimately improve socio-economic condition of the people of the district.*

*Community lands (i.e. the land within the school boundaries, namghar etc.) may be covered by block plantation. Species like Sissoo, Simul, Casuarina species, fruit trees like Guava, Jackfruit etc are suggested to consider under this plantation.*

*For erosion caused by small drainage lines treatment by vegetative measures is suggested. Grass species like citronella, vetivar grass etc. are suitable for this purpose. Species like 'Arahar' can be grown in rows in between the grass plantations. This will yield economic benefit also.*

*River bank erosion is one of the major erosion problems of the district. Bank erosion caused by rivers like Brahmaputra, Bhogdoi, Jhanji, Disoi etc. can be protected by Bamboo pallasiding, Bamboo cribs and timber spur in some of the specific locations to save agricultural field. Some areas of the district are under active degradation due to river erosion. It is proposed to use Bamboo pallasiding, Bamboo cribs for river training works in the affected areas.*

*In some of the areas of the district water comes from high land and suddenly drops at low-lying agricultural fields. In this type of water drops soil erosion is very high. This type of water erosion could be checked by using timber, local bhaluka bamboo etc. To tackle this type of situation in different places of the district brush wood dams are suggested.*

Sheet erosion and rill erosion in the riverbank are also significant soil erosion issues in the district. It is also a common scene in all wastelands where vegetative cover is very less. Vast areas are lying unused or fallow along the rivers, specially in the recent alluvial deposition areas. These areas may be considered for protective afforestation.

The natural discharge from an area could not be prevented but at the same time it is required to prevent the inflow of water also. To tackle this type of situation, sluice gate is considered to be the most appropriate measure. For this purpose sluice gates are suggested in the district.

Adoption of Horticulture, Forestry and Medicinal plants are essential both for economic and ecological reasons. The horticultural crops like orange, citrus, pineapple, banana, guava, coconut etc., medicinal plants like amla, hartaki, neem etc. are grown in some parts of the district. These plantation also have long-term impact in improving the micro-climate and re-distribute nutrients from lower layers of soils and restore ecological balance. These crops may be cultivated in large-scale at all suitable areas of the district.

The plantation activity in the district is suggested for roadsides also. For the road side plantation, the tree species suggested are sissou, simul, gomari, fruit trees like jackfruit, olive etc., medicinal plants like neem, amla etc. ornamental plant like debdaru, nahar etc. These trees can yield good economic benefit, improve aesthetic beauty of the area and will also improve environmental quality.

Suggestions are given to improve the productivity of inland fisheries using 'Beels' that have been in existence from historical times like 'Gelabeel'. Water conservation/harvesting, pisciculture, irrigation to the water scarcity areas by using low lift pumps, creation of recreational facilities are some of its multipurpose uses.

Though there is no typical gully erosion in the district, some nalla/streams are causing erosion in agricultural land. Nalla bund or check bund may be used to check erosion and for water conservation very effectively in small streams of the district. For this purpose nalla bund/check bund are suggested.

It is also suggested to establish extension services for soil and water conservation in the district, which is still lacking in the state. This will create

awareness and will increase involvement of farmers in checking erosion. Local governing bodies, NGOs and other institutional arrangements should be involved in creating awareness among the farmers.

Model estimates for different types of erosion control and water conservation measures are prepared using the specification emerged out of the studies and designs. Based on the number of structures of different kinds the total cost for the proposed conservation measures for the district has been worked out. The project cost for the development components has been estimated as **20,00.00 lakhs (twenty crores)** only.

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Date: 31.03.2009  
Place: Tezpur, Assam

Sd/-  
**Dr. S. C. Patra**  
Director, NERIWALM

## ***EXECUTIVE SUMMARY***

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*structures. Recreational facilities could also be created. This will create self employment for the people and help in economic growth of the district.*

*Due emphasis is given on demonstration of new and sustainable technologies for agricultural and horticultural crops. These are suggested for on-farm water management, flood-resistant short duration varieties, Integrated Pest Management (IPM), Integrated Plant Nutrient Management (IPNM), diversification of farming system, organic farming, use of bio-fertilizers, multiple cropping, improved inter cropping, value added agriculture and marketing of produce etc. Alternate land use systems like agro-forestry, agri-horticulture etc. may be tested. For this purpose some selected plots of land in different places of the district are suggested to utilize.*

*The som plantation is meant to promote sericulture in the district. The climate of the district is also suitable for som plantation. Suitable land may be covered by this plantation which will help in soil and water conservation, increase infiltration, decrease overland flow expand the sericulture activity and ultimately improve socio-economic condition of the people of the district.*

*Community lands (i.e. the land within the school boundaries, namghar etc.) may be covered by block plantation. Species like Sissoo, Simul, Casuarina species, fruit trees like Guava, Jackfruit etc are suggested to consider under this plantation.*

*For erosion caused by small drainage lines treatment by vegetative measures is suggested. Grass species like citronella, vetivar grass etc. are suitable for this purpose. Species like 'Arahar' can be grown in rows in between the grass plantations. This will yield economic benefit also.*

*River bank erosion is one of the major erosion problems of the district. Bank erosion caused by rivers like Brahmaputra, Bahini, Digaru, Bharalu etc. can be protected by Bamboo pallasiding, Bamboo cribs and timber spur in some of the specific locations to save agricultural field. Some areas of the district are under active degradation due to river erosion. It is proposed to use Bamboo pallasiding, Bamboo cribs for river training works in the affected areas.*

*In some of the areas of the district water comes from high land and suddenly drops at low-lying agricultural fields. In this type of water drops soil erosion is very high. This type of water erosion could be checked by using*

timber, local bhaluka bamboo etc. To tackle this type of situation in different places of the district brush wood dams are suggested.

Sheet erosion and rill erosion in the riverbank are also significant soil erosion issues in the district. It is also a common scene in all wastelands where vegetative cover is very less. Vast areas are lying unused or fallow along the rivers, specially in the recent alluvial deposition areas. These areas may be considered for protective afforestation.

The natural discharge from an area could not be prevented but at the same time it is required to prevent the inflow of water also. To tackle this type of situation, sluice gate is considered to be the most appropriate measure. For this purpose sluice gates are suggested in the district.

Adoption of Horticulture and Forestry are essential both for economic and ecological reasons. The horticultural crops like orange, citrus, pineapple, banana, guava, coconut etc. are grown in some parts of the district. These plantation also have long-term impact in improving the micro-climate and re-distribute nutrients from lower layers of soils and restore ecological balance. These crops may be cultivated in large-scale at all suitable areas of the district.

The plantation activity in the district is suggested for roadsides also. For the road side plantation, the tree species suggested are sissoo, simul, gomari, fruit trees like jackfruit, olive etc., medicinal plants like neem, amla etc. ornamental plant like debdaru, nahar etc. These trees can yield good economic benefit, improve aesthetic beauty of the area and will also improve environmental quality.

Suggestions are given to improve the productivity of inland fisheries using 'Beels' that have been in existence from historical times like 'Deepar beel'. Water conservation/harvesting, pisciculture, irrigation to the water scarcity areas by using low lift pumps, creation of recreational facilities are some of its multipurpose uses.

Gully erosion is one of the major soil erosion in the district causing maximum degradation in agricultural land. Appropriate gully erosion measures may be taken up to check erosion to protect agricultural land. For this purpose gully control structures/bund are suggested.

It is also suggested to establish extension services for soil and water conservation in the district, which is still lacking in the state. This will create

awareness and will increase involvement of farmers in checking erosion. Local governing bodies, NGOs and other institutional arrangements should be involved in creating awareness among the farmers.

Model estimates for different types of erosion control and water conservation measures are prepared using the specification emerged out of the studies and designs. Based on the number of structures of different kinds the total cost for the proposed conservation measures for the district has been worked out. The project cost for the development components has been estimated as **20,00.00 lakhs (twenty crores)** only.

On commencement of the project further specific surveys may become necessary. 5% of the cost of development activities may be provided for surveys and estimate preparation for sanctioning within the departments.

Again, 5% of the development cost may be provided for conducting workshop & training for departmental officers/staff for project implementation, awareness/community mobilization programme, extension activities and monitoring and evaluation of the project. Cost for pre-project benchmark surveys, mid term evaluation, post project assessment, environmental audit by independent agencies are also form part of the project.

10% of the cost towards development components may be provided as administration cost to meet the expenditure on salary, wages, and other office expenses.

The total project cost (including 20% of cost for development component as management component) for the district has been estimated as **24,00.00 lakhs, (twenty four crores)** only. Five years period is suggested for project implementation in phased manner.

Date: 31.03.2009  
Place: Tezpur, Assam

Sd/-  
**Dr. S. C. Patra**  
Director, NERIWALM

## ***EXECUTIVE SUMMARY***

*This detailed project report (DPR) is the outcome of the study conducted by North Eastern Regional Institute of Water and Land Management (NERIWALM), Tezpur. In this connection, all the field data were provided by the Divisional Officer, Nalbari district, Soil Conservation Department, Govt. of Assam. The data submitted by the department were analyzed at NERIWALM and this DPR has been prepared for work implementation in the district to tackle the soil erosion problem. Qualitative improvement of soil erosion and management of water and its conservation is the ultimate goal of this DPR.*

*The DPR is divided into seven chapters. In this volume the geographical setting of the study area, nature and extent of soil erosion, suitable control measures for soil erosion and water conservation, cost estimation and benefit-cost analysis, suggestions for soil and water conservation extension and the suggestions for project implementation along with the conclusions are included. In this DPR suitable conservation measures indicating activities to be taken up are also given.*

*This study revealed that soil erosion is an acute problem in different parts of the district. Erosion in the valley area is more due to biotic interference in the catchment area of the rivers, which should be minimized and controlled. Co-ordinated action is required to the specific regional erosion issues of the district. Large areas are under active degradation due to the erosion hazard in recent times. The soil erosion problem has deleterious impact on the agriculture, economy and environment of the district. Qualitative study of soil erosion, its nature and extent has been conducted for the district. The major causes of soil erosion identified in the district are: (i) River bank erosion of five six rivers viz. Brahmaputra, Pagladia, Nona, Baralia, Mara Pagladia, Buradia and many other small rivers. A number of rivers, which originate in the Himalayan foothills flow southwards and ultimately fall in Brahmaputra River. ii) Sheet erosion due to reduction of vegetation cover iii) Land degradation due to water logging/drainage congestion in the low lying areas iv) Flood inundation. Gully formation and erosion is also one of the main erosion observed in the district.*

*The major drainage lines of the district are identified. Most of the drainage lines are perennial in nature. To prepare a comprehensive plan for*

soil and water conservation for the district, the district area is delineated into smaller units of watershed and sub watershed. The specific erosion problems of the district are identified and management plan has been prepared for erosion control and water conservation.

The suitable control measures suggested for the district are 1. Earthen drainage channel, 2. Earthen ring bund cum road, 3. Water harvesting tank cum Fish pond, 4. Demonstration of new and sustainable technologies, 5. Soil plantation, 6. Block plantation, 7. Drainage line treatment by vegetative measures, 8. River training and bank protection work, 9. Brush wood dam, 10. Protective afforestation, 11. Sluice gate, 12. Horticultural plantation, 13. Roadside plantation, 14. Natural water body development for pisciculture and recreation, 15. Nalla bund/Check bund. Besides these methods some traditional techniques of soil and water conservation may be very effective and suitable for local conditions. Therefore, such techniques are also suggested to take up.

Improper drainage and water logging is a common scene in many villages of the district in rainy season. Scientific drainage system may be provided to overcome this problem and for this purpose earthen drainage channels are suggested.

The flood inundation is also one of the major problems for crop cultivation and a major cause of land degradation in the district. To save a vast areas of land from flood inundation and land degradation earthen ring bund may be taken up. The bunds will serve as connecting road to the villages/farm road also.

The water harvesting may be done in different forms like rainwater harvesting, insitu harvesting in field, run off harvesting, direct harvesting in ponds in farmers' field etc. which may create a huge water spread area in the district. This activity could promote pisciculture, duck rearing in addition to agriculture. Thus water harvesting and its management for various uses are given equal emphasis as erosion control. Considering the vast scope suitable areas are suggested for water harvesting cum fishery development in the district. Pisciculture will be an additional feature in the water harvesting structures. Recreational facilities could also be created. This will create self employment for the people and help in economic growth of the district.

Due emphasis is given on demonstration of new and sustainable technologies for agricultural and horticultural crops. These are suggested for on-farm water management, flood-resistant short duration varieties, Integrated Pest Management (IPM), Integrated Plant Nutrient Management (IPNM), diversification of farming system, organic farming, use of bio-fertilizers, multiple cropping, improved inter cropping, value added agriculture and marketing of produce etc. Alternate land use systems like agro-forestry, agri-horticulture etc. may be tested. For this purpose some selected plots of land in different places of the district are suggested to utilize.

The som plantation is meant to promote sericulture in the district. The climate of the district is also suitable for som plantation. Suitable land may be covered by this plantation which will help in soil and water conservation, increase infiltration, decrease overland flow expand the sericulture activity and ultimately improve socio-economic condition of the people of the district.

Community lands (i.e. the land within the school boundaries, namghar etc.) may be covered by block plantation. Species like Sissoo, Simul, Casuarina species, fruit trees like Guava, Jackfruit etc are suggested to consider under this plantation.

For erosion caused by small drainage lines treatment by vegetative measures is suggested. Grass species like citronella, vetivar grass etc. are suitable for this purpose. Species like 'Arahar' can be grown in rows in between the grass plantations. This will yield economic benefit also.

River bank erosion is one of the major erosion problems of the district. Bank erosion caused by rivers like Brahmaputra, Pagladia, Nona, Baralia, Mara Pagladia and Buradia etc. can be protected by Bamboo pallasiding, Bamboo cribs and timber spur in some of the specific locations to save agricultural field. Some areas of the district are under active degradation due to river erosion. It is proposed to use Bamboo pallasiding, Bamboo cribs for river training works in the affected areas.

In some of the areas of the district water comes from high land and suddenly drops at low-lying agricultural fields. In this type of water drops soil erosion is very high. This type of water erosion could be checked by using timber, local bhaluka bamboo etc. To tackle this type of situation in different places of the district brush wood dams are suggested.

Sheet erosion and rill erosion in the riverbank are also significant soil erosion issues in the district. It is also a common scene in all wastelands where vegetative cover is very less. Vast areas are lying unused or fallow along the rivers, specially in the recent alluvial deposition areas. These areas may be considered for protective afforestation.

The natural discharge from an area could not be prevented but at the same time it is required to prevent the inflow of water also. To tackle this type of situation, sluice gate is considered to be the most appropriate measure. For this purpose sluice gates are suggested in the district.

Adoption of Horticulture, Forestry and Medicinal plants are essential both for economic and ecological reasons. The horticultural crops like orange, citrus, pineapple, banana, guava, coconut etc., medicinal plants like amla, hartaki, neem etc. are grown in some parts of the district. These plantation also have long-term impact in improving the micro-climate and re-distribute nutrients from lower layers of soils and restore ecological balance. These crops may be cultivated in large-scale at all suitable areas of the district.

The plantation activity in the district is suggested for roadsides also. For the road side plantation, the tree species suggested are sissoo, simul, gomari, fruit trees like jackfruit, olive etc., medicinal plants like neem, amla etc. ornamental plant like debdaru, nahar etc. These trees can yield good economic benefit, improve aesthetic beauty of the area and will also improve environmental quality.

Suggestions are given to improve the productivity of inland fisheries using 'Beels' that have been in existence from historical times. Water conservation/harvesting, pisciculture, irrigation to the water scarcity areas by using low lift pumps, creation of recreational facilities are some of its multipurpose uses.

Gully erosion is one of the major soil erosion in the district causing maximum degradation in agricultural land. Appropriate gully erosion measures may be taken up to check erosion to protect agricultural land. For this purpose gully control structures/bund are suggested.

It is also suggested to establish extension services for soil and water conservation in the district, which is still lacking in the state. This will create awareness and will increase involvement of farmers in checking erosion. Local

*governing bodies, NGOs and other institutional arrangements should be involved in creating awareness among the farmers.*

*Model estimates for different types of erosion control and water conservation measures are prepared using the specification emerged out of the studies and designs. Based on the number of structures of different kinds the total cost for the proposed conservation measures for the district has been worked out. The project cost for the development components has been estimated as **20,00.00 lakhs (twenty crores)** only.*

*On commencement of the project further specific surveys may become necessary. 5% of the cost of development activities may be provided for surveys and estimate preparation for sanctioning within the departments.*

*Again, 5% of the development cost may be provided for conducting workshop & training for departmental officers/staff for project implementation, awareness/community mobilization programme, extension activities and monitoring and evaluation of the project. Cost for pre-project benchmark surveys, mid term evaluation, post project assessment, environmental audit by independent agencies are also form part of the project.*

*10% of the cost towards development components may be provided as administration cost to meet the expenditure on salary, wages, and other office expenses.*

*The total project cost (including 20% of cost for development component as management component) for the district has been estimated as **24,00.00 lakhs, (twenty four crores)** only. Five years period is suggested for project implementation in phased manner.*

Date: 31.03.2009  
Place: Tezpur, Assam

Sd/-  
**Dr. S. C. Patra**  
Director, NERIWALM



## 6.SONITPUR

### *EXECUTIVE SUMMARY*

*This detailed project report (DPR) is the outcome of the study conducted by North Eastern Regional Institute of Water and Land Management (NERIWALM), Tezpur. In this connection, all the field data were provided by the Divisional Officer, Sonitpur district, Soil Conservation Department, Govt. of Assam. The data submitted by the department were analyzed at NERIWALM and this DPR has been prepared for work implementation in the district to tackle the soil erosion problem. Qualitative improvement of soil erosion and management of water and its conservation is the ultimate goal of this DPR.*

*The DPR is divided into seven chapters. In this volume the geographical setting of the study area, nature and extent of soil erosion, suitable control measures for soil erosion and water conservation, cost estimation and benefit-cost analysis, suggestions for soil and water conservation extension and the suggestions for project implementation along with the conclusions are included. In this DPR suitable conservation measures indicating the area to be covered are also given.*

*This study revealed that soil erosion is an acute problem in different parts of the district. The district has interstate state border also with Arunachal Pradesh, which is contributing largely towards erosion to the district. More erosion in plan areas is due to biotic interference in the catchment area, which should be minimized and controlled. The erosion in the district is regional in nature for which inter state co-ordinated actions are required. Large areas are under active degradation due to the erosion hazard in recent times. The soil erosion problem has deleterious impact on the agriculture, economy and environment of the district. Qualitative study of soil erosion, its nature and extent has been conducted for the district. The major causes of soil erosion identified in the district are: (i) River bank erosion of five major rivers viz. Brahmaputra, Ziabharali, Gabharu, Borgang & Buroi. A number of rivers which originate in the Himalayan foothills flow southwards and ultimately fall in Brahmaputra River. ii) Sheet erosion due to reduction of vegetation cover iii) Land degradation due to water logging/drainage congestion iv) Flood inundation. Gully formation and erosion is also observed in the district.*

The major drainage lines of the district are identified. All the drainage lines are perennial in nature. To prepare a comprehensive plan for soil and water conservation for the district, the district area is delineated into smaller units of watershed and sub watershed. The specific erosion problems of the district are identified and management plan has been prepared for erosion control and water conservation.

The suitable control measures suggested for the district are 1. Earthen drainage channel; 2. Earthen ring bund cum road, 3. Water harvesting tank cum Fish pond, 4. Demonstration of new and sustainable technologies, 5. Soil plantation, 6. Block plantation, 7. Drainage line treatment by vegetative measures, 8. River training and bank protection work, 9. Brush wood dam, 10. Protective afforestation, 11. Sluice gate, 12. Horticultural plantation, 13. Roadside plantation, 14. Natural water body development for pisciculture and recreation, 15. Gully control structure/Check bund. Besides these methods some traditional methods of soil and water conservation may be very effective suitable for local conditions. Therefore, such techniques are suggested to take up.

Improper drainage and water logging is a common scene in many villages of the district in rainy season. Scientific drainage system may be provided to overcome this problem and for this purpose earthen drainage channels are suggested.

The flood inundation is also one of the major problems for crop cultivation and a major cause of land degradation in the district. To save a vast areas of land from flood inundation and land degradation earthen ring bund may be taken up. The bunds will serve as connecting road to the villages/farm road also.

The water harvesting may be done in different forms like rainwater harvesting, insitu harvesting in field, run off harvesting, direct harvesting in ponds in farmers' field etc. which may create a huge water spread area in the district. This activity could promote pisciculture, duck rearing in addition to agriculture. Thus water harvesting and its management for various uses are given equal emphasis as erosion control. Considering the vast scope suitable areas are suggested for water harvesting cum fishery development in the district. Pisciculture will be an additional feature in the water harvesting

structures. Recreational facilities could also be created. This will create self employment for the people and help in economic growth of the district.

Due emphasis is given on demonstration of new and sustainable technologies for agricultural and horticultural crops. These are suggested for on-farm water management, flood-resistant short duration varieties, Integrated Pest Management (IPM), Integrated Plant Nutrient Management (IPNM), diversification of farming system, organic farming, use of bio-fertilizers, multiple cropping, improved inter cropping, value added agriculture and marketing of produce etc. Alternate land use systems like agro-forestry, agri-horticulture etc. may be tested. For this purpose some selected plots of land in different places of the district are suggested to utilize.

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River bank erosion is one of the major erosion problems of the district. Bank erosion caused by rivers like Ziabharali, Gabharu, Borgang, Buroi etc. can be protected by Bamboo pallasiding, Bamboo cribs and timber spur in some of the specific locations to save agricultural field. Some areas of the district are under active degradation due to river erosion. It is proposed to use Bamboo pallasiding, Bamboo cribs for river training works in the affected areas.

In some of the areas of the district water comes from high land and suddenly drops at low-lying agricultural fields. In this type of water drops soil erosion is very high. This type of water erosion could be checked by using

timber, local bhaluka bamboo etc. To tackle this type of situation in different places of the district brush wood dams are suggested.

Sheet erosion and rill erosion in the riverbank are also significant soil erosion issues in the district. It is also a common scene in all wastelands where vegetative cover is very less. Vast areas are lying unused or fallow along the rivers, specially in the recent alluvial deposition areas. These areas may be considered for protective afforestation.

The natural discharge from an area could not be prevented but at the same time it is required to prevent the inflow of water also. To tackle this type of situation, sluice gate is considered to be the most appropriate measure. For this purpose sluice gates are suggested in the district.

Adoption of Horticulture and Forestry are essential both for economic and ecological reasons. The horticultural crops like orange, citrus, pineapple, banana, guava, coconut etc. are grown in some parts of the district. These plantation also have long-term impact in improving the micro-climate and redistribute nutrients from lower layers of soils and restore ecological balance. These crops may be cultivated in large-scale at all suitable areas of the district.

The plantation activity in the district is suggested for roadsides also. For the road side plantation, the tree species suggested are sissoo, simul, gomari, fruit trees like jackfruit, olive etc., medicinal plants like neem, amla etc. ornamental plant like debdaru, nahar etc. These trees can yield good economic benefit, improve aesthetic beauty of the area and will also improve environmental quality.

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awareness and will increase involvement of farmers in checking erosion. Local governing bodies, NGOs and other institutional arrangements should be involved in creating awareness among the farmers.

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Date: 31.03.2009  
Place: Tezpur, Assam

Sd/-  
**Dr. S. C. Patra**  
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