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Editorial

Wetlands are vital for human survival. They are among the world's most productive ecosystems supporting a wide range of biological diversity. They maintain many natural cycles and provide the water and productivity upon which countless species of plants and animals depend for survival. Wetlands are crucial for the countless benefits or "ecosystem services" that they provide humanity, ranging from freshwater supply, food and building materials, and biodiversity, to flood control, groundwater recharge, and climate change mitigation.

Wetlands provide shelter and nursery areas for commercially and recreationally important animals, as well as wintering grounds for migratory birds. The feeding, breeding and stop-over areas across and between continents that migratory birds depend on requires coordinated wetlands conservation efforts among many nations. Wetlands are also important sources of food supporting not only the cultivation of food grains but also the various animal and plant life of a particular region that contributes to productivity through nutrient cycling, pest and disease regulation. The entire production of inland captured fisheries and most coastal fisheries is derived from wetlands, as is most aquaculture production. Wetlands are also popular destinations for recreational activities such as hiking, fishing, bird watching and photography.

Despite their uses and benefits, wetlands have constantly been under threat due to human interference. Human activities threaten wetlands in several different ways which can be chemical, physical or biological. Pollutants from anthropological activities such as industrial processes, agriculture and leakage from landfills and waste dumps can degrade the quality of a wetland ecosystem. The removal of natural vegetation, introduction of invasive species, change in land use patterns and over grazing by domestic animals also negatively affects the biodiversity

Studies have shown that the number of wetlands around the world are declining at a rapid pace. In order to meet the challenges of the future such as providing food and water security, human health, reduction of risk from disasters and climate change, wetlands should be conserved and used sustainably. The present issue covers the conservation and management of the Doyang Reservoir Wetland in Nagaland under the National Plan for conservation of Aquatic Ecosystems and the implementation of various activities under the project by the Department of Environment, Forests & Climate Change, Govt. of Nagaland.

Doyang

The Doyang River is one of the major rivers in Nagaland and runs along the southern boundary of the state. It originates from the Japfü Hill near the southern slope of Mao in Manipur and moves in a southwest direction passing through Kohima district and flows northward into Zunheboto and Wokha. It passes through a great part of Wokha District and flows south westerly into Dhansiri in Sibsagar, District of Assam. The river has a length of 167 km (from Gariphema/Ghathashi area to Liphi) and a catchment area of 3283 km^2. It has three main tributaries Tsui, Tullo and Tishi.

The Doyang Hydroelectric Project (DHEP) is located in this river at 26°14 N Latitude and 94°16 E Longitude in Wokha district. The construction of Doyang Dam was completed in the year 2000. It is an earthern dam built for hydro-electric purpose (75 MW capacity) as well as for drinking water supply. The Doyang reservoir has a gross storage capacity of 535 MCM (Million Cubic Meter) and effective storage capacity of 370 MCM. Doyang dam is approximately 462 m long and 92 m high. It has four spillway radial gates with designed spillway capacity of 5977 cumec.

The dam area of the Doyang River is also an important eco-tourism spot for bird-watchers as it is a roosting place of the migratory bird Amur falcon (*Falco amurensis*). The falcons travel almost 22,000 km every year during October–November from Southeastern Siberia and Northern China in millions and spend nearly a month around the vicinity of the dam. The river also has a strong economic and traditional attachment to the local people because of its sufficient fertile plains and slopes for cultivation. However, the changing land use practices, increasing population and deforestation in the catchment and river banks, shifting cultivation along the river have threatened the riparian habitats as never before. This has drawn much attention in preserving the riparian vegetation along the streams and in other sensitive areas in order to protect the water quality and habitat value of these areas.

References:
Lkr, A., Singh, M.R. & Puro, N. Assessment of water quality status of Doyang River, Nagaland, India, using Water Quality Index.

Laishram S, Yumnam J (2016) State of India's Rivers.

National Plan for Conservation of Aquatic Ecosystems (NPCA)

The NPCA is a conservation programme for both wetlands and lakes. It is a centrally-sponsored scheme, currently being implemented by the MoEF&CC, and was formulated by merging the National Lake Conservation Plan and the National Wetlands Conservation Programme. The aims and objectives of the scheme are as follows:

- It aims at holistic conservation and restoration of lakes & wetlands for achieving desired water quality enhancement besides improvement in biodiversity and ecosystem through an integrated and multidisciplinary approach with a common regulatory framework.
- The scheme would contribute to the reduction of pollution loads and improvement in biodiversity as also the goods and services provided by these water bodies to the stakeholders.

Conservation & Management of Doyang Reservoir Wetland
(Source: Department of Environment, Forests & Climate Change, Nagaland)

The Doyang Reservoir Wetland project under the National Plan for Conservation of Aquatic Ecosystem (NPCA) is the first of its kind for the state and implemented by the Department of Environment, Forests & Climate Change, Government of Nagaland. Altogether twenty (20) villages have been taken up for Implementation of Conservation and Management of Doyang Wetland Reservoir. Works under the project included various activities and interventions that were targeted towards improving the overall health of Doyang Reservoir Wetland, while also addressing the needs and requirements of the local community in terms of livelihood generation. The various activities undertaken included livelihood options such as Assisted Natural Regeneration, Artificial Regeneration, Grassland and Fodder Plantation and Horticulture Crop distribution. Pig Breeding Centers as well as Nurseries were also set up. Poultry chicks were also distributed to all villages in which the project was undertaken. Infrastructure works included construction of Brushwood Check Dams, Gully Plugs, Watch Towers, Water Hole cum Water Harvesting structures, Food Processing Unit and Trenches. Awareness and Training Programmes were also conducted.

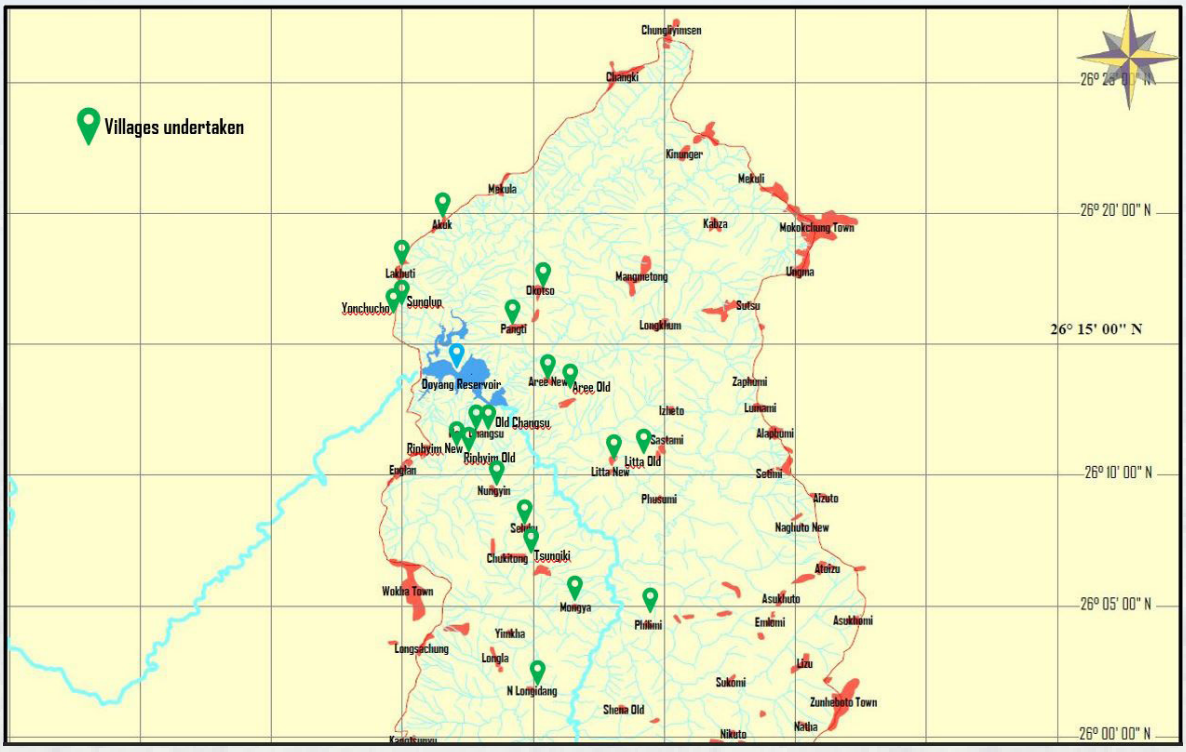
View of Doyang Reservoir

Village Wise Work Progress

Out of 20 villages, eight (8) villages fall under Baghty Range, two (2) other villages under Doyang Beat, Wokha Forest Division while the remaining ten (10) villages comes under Doyang Afforestation Range, Doyang Plantation Division, Wokha (Table 1).

Table 1: List of villages

Sl. No.	Village Name	Range	Division	Remarks
1	Tsungiki	Doyang Afforestation Range	Doyang Plantation Division	Completed
2	Mungya	Doyang Afforestation Range	Doyang Plantation Division	Completed
3	Seluku	Doyang Afforestation Range	Doyang Plantation Division	Completed
4	Nungying	Doyang Afforestation Range	Doyang Plantation Division	Completed
5	Changsu Old	Doyang Afforestation Range	Doyang Plantation Division	Completed
6	Changsu New	Doyang Afforestation Range	Doyang Plantation Division	Completed
7	N. Longidang	Doyang Afforestation Range	Doyang Plantation Division	Completed
8	Littami Old	Doyang Afforestation Range	Doyang Plantation Division	Completed
9	Littami New	Doyang Afforestation Range	Doyang Plantation Division	Completed
10	Philimi	Doyang Afforestation Range	Doyang Plantation Division	Completed
11	Aree Old	Baghty Range	Wokha Forest Division	Completed
12	Aree New	Baghty Range	Wokha Forest Division	Completed
13	Pangti	Baghty Range	Wokha Forest Division	Completed
14	Okotso	Baghty Range	Wokha Forest Division	Completed
15	Yonchucho	Baghty Range	Wokha Forest Division	Completed
16	Sunglup	Baghty Range	Wokha Forest Division	Completed
17	Lakhuti	Baghty Range	Wokha Forest Division	Completed
18	Akuk	Baghty Range	Wokha Forest Division	Completed
19	Riphyim Old	Doyang Beat	Wokha Forest Division	Completed
20	Riphyim New	Doyang Beat	Wokha Forest Division	Completed



Location of the villages around Doyang Reservoir in which the project has been implemented

Activity Wise Work Progress

Works under the project includes various activities and interventions that is targeted towards improving the overall health of Doyang Reservoir Wetland, while also addressing the needs and requirements of local community in terms of livelihood generation.
The various works undertaken so far are:

1. Brushwood Check dam
2. Gully Plugging
3. Assisted Natural Regeneration
4. Artificial Regeneration
5. Grassland and Fodder Plantation
6. Watchtower
7. Horticulture
8. Horticulture Food Processing Unit
9. Water Hole cum Water Harvesting Structure
10. Trenches
11. Pig Breeding Centre
12. Poultry Distribution
13. Nursery Establishment
14. Awareness Program
15. Formation of Eco Development Committees

Brushwood Check Dam

Brushwood check dams made of posts and brush are placed across a gully. The main objective of brushwood check dams is to hold fine material carried by flowing water in the gully. These can be employed in connection with land use changes such as reforestation or improved range management until vegetative and slope treatment measures become effective.

12 streams were selected on which 20 nos. of low-cost brushwood check dams were constructed in order to check siltation in the reservoir by controlling erosion brought in by streams through runoff. The check dams have been completed in all the streams viz. Tzuza, Ngalang, Shumrow, Tontongchu, Yaksokyu, Ralantchu, Chayii, Lumki, Tchupum, Tchupvu, Rampung and Sangphya.

Brushwood checkdam at Tzuza stream.

Brushwood checkdam at Shumrow stream

Gully Plugging

Gully plugs, also called check dams, are mainly built to prevent erosion and to settle sediments and pollutants. Furthermore, it is possible to keep soil moisture due to infiltration. A check dam (also called gully plug) is a small, temporary or permanent dam constructed across a drainage ditch, swale, or channel to lower the speed of concentrated flows for a certain design range of storm events. Reduced runoff speed reduces erosion and gully erosion in the channel and allows sediments and other pollutants to settle out.

For this activity as well, 12 streams were selected on which four boulder-based gully plugs were constructed in order to check siltation in the reservoir by controlling erosion brought in by streams through runoff. The check dams have been completed in all the streams viz. Tzuza, Ngalang, Shumrow, Tontongchu, Yaksokyu, Ralantchu, Chayii (26°1'41.5" N, 94°19'58.4" E), Lumki, Tchupum, Tchupvu, Rampung and Sangphya (26°11'06.2" N, 094°16'53.0" E).

Gully plug at Yaksokyu stream

Gully plug at Rampung stream

Assisted Natural Regeneration (ANR)

In all villages, 50 Ha of degraded forest area was taken up for plantation. Activities undertaken included survey and demarcation, cut back operations (CBO) cleaning including cutting of weeds and plantation. Species such as Hollock (*Terminalia myrocarpa*), Khokon (*Duabanga grandiflora*), Bogi-poma (*Chukrasia tabularis*), Teeta chap, Cadam (*Neolamarckia cadamba*), Badam, Aojar (*Lagerstromia speciosa*), Seesam (*Dalbergio sissoo*), Lali poma (*Dysoxylum excelsum*), Pine (*Pinus spp.*), Semul (*Bombax ceiba*), Teak (*Tectona grandis*), Jamun (*Syzygium cumini*), Hilika (*Terminalia chebula*), Uriam (*Bischofia javanica*), Ghora Neem (*Melia azedarach*) etc. were planted. Plantation was carried out as per the work program and 200 seedlings per Ha were planted.

ANR plantation at Okotso village

ANR plantation at Seluku village

Artificial Regeneration (AR)

For artificial regeneration plantation, 6 villages were selected- Pangti, Lakhuti, Akuk, Littami New, Seluku and Nungying. In total 100 Ha of area was covered under artificial regeneration. Activities undertaken included survey and demarcation, cut back operations (CBO) cleaning including cutting of weeds and plantation. Species such as Hollock (*Terminalia myrocarpa*), Khokon (*Duabanga grandiflora*), Bogi-poma (*Chukrasia tabularis*), Teeta chap, Cadam (*Neolamarckia cadamba*), Badam, Aojar (*Lagerstromia speciosa*), Seesam (*Dalbergio sissoo*), Lali poma (*Dysoxylum excelsum*), Pine (*Pinus spp.*), Semul (*Bombax ceiba*), Teak (*Tectona grandis*), Jamun (*Syzygium cumini*), Hilika (*Terminalia chebula*), Uriam (*Bischofia javanica*), Ghora Neem (*Melia azedarach*) etc. were planted. Plantation was carried out as per the work program and 1100 seedlings per Ha were planted.

AR Plantation at Pangti Village

Grassland and Fodder Plantation

For fodder and grassland plantation, 6 villages were selected- Okotso, Ripyim Old, Riphyim New, N. Longidang, Changsu Old and Changsu New. In total, 100 Ha of area was covered under fodder and grassland plantation. Works included survey and demarcation, cut back operations (CBO), cleaning including cutting of weeds, and plantation. Species such as Banana (*Musa spp.*), Bamboo (*Bambusa spp.* and *Dendrocalamus spp.*), Elephant Grass (Pennisetum pupureum), Cadam (*Neolamarckia cadamba*), Semul (*Bombax ceiba*), Jamun (*Syzygium cumini*), Hilika (*Terminalia chebula*), Uriam (*Bischofia javanica*), Ghora Neem (*Melia azedarach*), Neem (Azadirachta indica), Aonla (Phyllantus indica) etc. were planted.

Grassland and Fodder Plantation at Changsu New village.

Grassland and Fodder Plantation at Riphyim Old village.

Habitat Improvement

Habitat improvement plantation for in-situ conservation of soft shelled turtle was carried out in Mekokla village. Species such as Hollock (*Terminalia myrocarpa*), Khokon (*Duabanga grandiflora*), Bogi-poma (*Chukrasia tabularis*), Teeta chap, Cadam (*Neolamarckia cadamba*), Badam, Aojar (*Lagerstromia speciosa*), Seesam (*Dalbergio sissoo*), Lali poma (*Dysoxylum excelsum*), Pine (*Pinus spp.*), Semul (*Bombax ceiba*), Jamun (*Syzygium cumini*), Hilika (*Terminalia chebula*), Uriam (*Bischofia javanica*), Ghora Neem (*Melia azedarach*) etc were planted.

Habitat Improvement at Mekokla village.

Watch Tower

10 villages were selected for construction of watch towers under the NPCA. The villages are N. Longidang, Tsungiki, Seluku, Nungying, Riphyim Old, Changsu Old, Okotso, Aree Old, Yonchucho and Akuk.

Watch towers at Aree Old & Akuk Village

Horticulture

Horticulture crops such as Litchi, Coffee, Cardamom, Orange, Jackfruit, Jamun, Banana, Ginger etc were provided to all the villages.

Distribution of Horticulture crops by Wokha Forest Division and Doyang Plantation Division.

Horticulture Food Processing Unit.

2 horticulture-based food processing units were set up, one each at Doyang and Tsungiki village respectively. Machineries such solar water heaters, solar street lights, ginger peeler, dryer, containers and packaging units were provided to the two units.

Water Hole cum Water Harvesting Structure

In all the villages, one water hole cum water harvesting structure was constructed. All twenty structures have been completed in Pangti, Okotso, Aree Old, Aree New, Sunglup, Yonchucho, Lakhuti, Akuk, Riphyim Old, Riphyim New, Changsu Old, Changsu New, Nungying, Tsungiki, Mungya, Seluku, Littami Old, Littami New and N. Longidang.

Waterhole cum Water Harvesting Structure at Yonchucho and Tsingiki village

Trenches

In each village, 24 numbers of trenches were made, amounting to 48.6 cu. m. of earth work per village. Altogether, for the 20 villages, a total of 480 trenches were made amounting to 972 cu. m. of earth work. Bamboos are abundantly available in the area, and hence it was used to make bamboo bunds along the trench. The local people also themselves contributed to this at no extra cost of the project. The added advantage for this form of trenching is that the local people can plant crops on the bunds as well.

Trenches at Okotso and Pangti Village

Livelihood Generation:

Two villages were selected to establish Pig Breeding Centres, one at Nungying and the other at New Riphyim village. 10 piglets each were provided to the breeding centres along with feeds. Poultry chicks were distributed to all the 20 villages. Chicks were provided to the villages along with the poultry feeds.

Pig Breeding Centres at Nungying and New Riphyim Village

Distribution of poultry by Wokha Forest Division and Doyang Plantation Division

Nursery Creation

Two nurseries were also established- one each at Wokha Forest Division and Doyang Plantation Division.

Nursery at Doyang Plantation Division

Awareness Activities

Students with calendar and reusable water bottles along with officials

The Wokha Forest Division organized the World Wetlands Day on 7th February 2020 at Vivekananda Kendra Vidyalaya, NEEPCO, Doyang wherein students were educated about the importance of wetlands and also encouraged to minimize the use of plastic and proper disposal of waste as it pollutes the water bodies. What marked the occasion was the bottle exchange program where the students were asked to collect disposed single use plastic (SUP) water bottles from their surroundings which were then handed over to the Forest Department. In return, the students were given reusable water bottles along with calendars. The SUP bottles were then used as an activity for the students by painting them to make a signboard that read "REUSE ME". This was followed by quiz and documentary on biodiversity and wildlife conservation.

Besides this, other awareness programmes such as observation of World Environment Day and Wildlife Week were also conducted and Eco Development Committees were formed in all 20 villages.

Formation of Eco Development Committees

All queries and feedback regarding this newsletter can be sent to:
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