A PRELIMINARY INVESTIGATION ON SOME POTENTIAL BIODIVERSITY HERITAGE SITES (BHSs) OF TRIPURA

SUBMITTED TO:
TRIPURA BIODIVERSITY BOARD (TBB)
Aranya Bhwan, Pt. Nehru Complex
Gurkhabasti, Agartala- 799 006

SUBMITTED BY:
DR. KOUSHIK MAJUMDAR
Centre for Bamboo Cultivation and Resources Utilization (BCRU),
Tripura University (A Central University),
Suryamaninagar-799022

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Prepared by:
Dr. Koushik Majumdar, Centre for Bamboo Cultiation and Resources Utilization, Department of Botany, Tripura University, Suryamaninagar-799022.
Dr. A K Gupta, Member Secretary, Tripura Biodiversity Board, Aranya Bhwan, Pt. Nehru Complex, Gurkhabasti, Agartala- 799 006

Research Advisor:
Prof. B K Datta, Department of Botany, Tripura University, Suryamaninagar-799022.
Prof. A K Saha, Department of Botany, Tripura University, Suryamaninagar-799022.

Editing and Compilation:
Dr. Koushik Majumdar
Mr. Bal Krishan Choudhary

Core Technical Team:

Mr. Biplab Banik, Research Scholar, Department of Botany, Tripura University
Mr. Jitardotya Debnath, Techical Assistant, Tripura University
TBB Staffs

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General Introduction:

The international Convention on Biological Diversity (CBD) has highlighted the importance of conserving biodiversity in the light of climate change, changing environments and growing human populations and participated nations have agreed to conserve 17% of areas with significant biodiversity by 2020 (CBD, 2011). India have been identified as particularly rich in biodiversity and have been targeted as of high importance in the REDD (Reducing Emissions from Deforestation and Forest Degradation) scheme. There are many factors that contribute to levels of biodiversity and its distribution within a particular site. India, a mega diverse country with only 2.4% of the world's land area, harbours 7-8% of all recorded species, including over 45,000 species of plants and 91,000 species of animals. It is also amongst the few countries that have developed a biogeographic classification for conservation planning, and has mapped biodiversity-rich areas in the country. Of the 34 global biodiversity hotspots, four are present in India, represented by the Himalaya, the Western Ghats, the North-east, and the Nicobar Islands. Considering the outstanding universal values and exceptionally high levels of endemism in the Western Ghats, 39 sites in the States of Kerala, Karnataka, Tamil Nadu and Maharashtra have been inscribed on the United Nations Education Scientific and Cultural Organization (UNESCO) World Heritage List in 2012. India has taken significant steps in inventorying the vast and

diverse biological heritage. Studies on freshwater and marine ecosystems, mycological work related to taxonomy and floristic studies have been recently carried out on various groups of fungi. India harbours large number of lichen species, which are nature's most remarkable alliances with at least 2300 species belonging to 305 genera and 74 families having been reported from India.

Forests in India are spread over an area of 692,027 km , covering 21.05% of the geographical area of the country. While the forest cover has either remained static or has reduced in many developing countries, India has added around 3 million hectares of forest and tree cover over the last decade. MoEF, has been persistently working towards increasing the total forest cover in India by initiating targeted afforestation programmes such as the Green India Mission (GIM). The total tree cover in India is estimated to be 9.08 million hectares, accounting for about 3% of the total geographic area of the country. The Wildlife Institute of India (WII) has prepared a biogeographic classification for the country, which has been designed to facilitate conservation planning, and to review the adequacy of existing protected areas to conserve the range of biological diversity in the country. From a network of 54 National Parks covering 21,003 km and 373 Sanctuaries covering 88,649 km^2 , giving a combined coverage of 1, 09,652 km^2 or 3.34% of the country's geographical area in 1988, the network has grown steadily, and as of 2014 there are 690 Protected Areas (PAs;102 National Parks, 527 Wildlife Sanctuaries, 57 Conservation Reserves and 4 Community

Reserves) covering 1, 66,851 km^2 or 5.07% of the country's geographical area. The country has 23 marine Protected Areas (PAs) in peninsular India and 106 in the islands. The country's biodiversity faces a variety of threats, ranging from land use changes in natural habitats to overexploitation of natural resources, proliferation of invasive species and climate change. A range of measures including enabling policy and legal framework, especially the National Environment Policy (NEP), 2006 have been put in place to mainstream environment, including biodiversity, in development planning processes.

Background of the report:

Globally, habitat depletion and fragmentation have contributed to the current loss of biodiversity. In India, the total forest area is decreasing along with the habitat suitability of many species. Natural forests are primary habitats for a substantial number of threatened species and, especially due to the reduction of large forest areas or continuous forest tracts. Forest conservation has traditionally concentrated on establishing forest reserves. Such reserves are vital due to their ability to maintain many taxa and ecological processes. One of the main constraints for conservation of biodiversity in India is the limited area of large forest belts. Many areas of high priority for biodiversity are located on the outside of protected area, private lands. However, protecting those small areas for biodiversity involves many challenges.

Protection of small parcels of forest with large ecological values is considered a cost-efficient way to conserve biodiversity in managed and fragmented forest landscapes. Biodiversity is closely linked to ecological security. Loss of biodiversity and bio-resources are in the increasing trend and also threatened by the human activities. The declaration of BHSs will ensure bringing home the values and ethics in the society and thereby protecting the environment ensuring availability of bio-resources for the present and future generations. According to the Indian Biological Diversity Act (2002), priority issues were setup to sustainable use of biodiversity, access and benefit sharing of biodiversity for commercial use, identification of species of conservation importance, documentation of People's Biodiversity Registers (PBRs), declaration of BHSs and local institutional mechanism in form of Biodiversity Management committees etc. The Biological Diversity Act, 2002 under the provisions of section 37 requires the State Biodiversity Boards (SBB) to notify in the official gazette and frame rules for the management and conservation of certain biodiversity rich areas as BHSs. BHSs are well defined areas that are unique ecologically fragile ecosystems-terrestrial, freshwater or marine having rich biodiversity comprising of any one or more of the components such as; species richness, high endemism, presence of rare, endemic and threatened species, keystone species, species of evolutionary significance, wild ancestors of domestic/cultivated species or land races or their varieties, past pre-eminence of biological components

represented by fossil beds and having cultural or aesthetic values. The following criteria have been proposed for declaration of '**Biodiversity Heritage Sites'**:

Criteria used for identification of Biodiversity Heritage Sites (BHS) in Tripura:

The BHS shall be identified in accordance with the definition laid by National Biodiversity Authority (NBA). Accordingly the following types of areas of biodiversity importance shall qualify as BHSs.

1. Areas that contain a mosaic of natural, semi-natural, and manmade habitats, which together contain a significant diversity of life forms:
2. Areas that contain significant domesticated biodiversity component and /or representative agro-ecosystems with on-going agricultural practices that sustain this diversity:
3. Areas that are significant from a biodiversity point of view as also are important cultural spaces such as sacred groves/trees and sites, or other large community conserved areas.
4. Areas including very small ones that offer refuge or corridors for threatened and endemic fauna and flora, such as community conserved areas or urban greens and wetlands.
5. All kinds of legal land uses whether government, community or private land could be considered under the above categories.
6. As far as possible those sites may be considered which are not covered under Protected Area network under the Wildlife Protection Act 1972 as amended.
7. Areas that provide habitats, aquatic or terrestrial, for seasonal migrant species for feeding and breeding.
8. Areas that are maintained as preservation plots by the research wing of Forest department.
9. Medicinal Plant Conservation Areas.

Proposed Biodiversity Heritage Sites of Tripura:

Tripura is a small hilly state is located in the North-Eastern part of the country, surrounded by Bangladesh on three sides and rich diversity of both flora and fauna. The physiographic of the state is unique in the source that more than 60% of the state is hilly and there are five distinct hill ranges which run parallel to each other from north to south interposed with valleys in between through which run all the rivers of the state, west ward till they meet the river Brahmaputra in Bangladesh. The total area of the state is 10,497.69 sq km, located between 22° - 56´ to 24° - 32´ North latitude and between 90° – 09´ to 92° - 20´ East longitude. The climate of the state is characterized by moderate temperatures and a highly humid atmosphere. Forest covers an area of about 6292.681 sq km, with the annual rainfall of about 247.9 cm and the temperature varies between 10° C- 35° C. These suitable tropical climate support luxurious growth of various types of forests scattered all over the state from hilly tract to plain. The rich natural resources like dense forest with numerous varieties, traditional use of medicinal plant and about 19 ethnic groups with co-operating nature can encourage anyone to study the forest resources used by the tribal of Tripura and its potentiality. The 19 ethnic groups have been settled down with their different language, tradition, culture on the hilly tracts of Tripura. The *Tripuri, Reang, Jamatia, Noatia, Chakma, Halam, Kuki, Lushai* and *Uchai* are the main adibasi communities; among them some were immigrants in this state from adjoining Assam and Chittagong Hill tracts. The abundant forest resources and available Jhum land of Tripura had been the prime facts of migration of those adibasi.

In Tripura, there are several sites has immense potentiality to be consider as BHS. But in this proposal we are proposing some sites which have greater potentiality and may be prioritized on the basis of their ecosystem services for future management and conservation implications of multiple biodiversity and conservation issues in Tripura. Based on our preliminary observation, these sites

have the qualities for multidirectional climate regulations; important provisioning services, cultural significance and several other supporting roles to maintain local biodiversity, economy and livelihoods, even owning significant contribution in climate change mitigations. Hence, immediate emphasize should need to declare those sites as BHS to take effective scientific investigations and management.

Methods of Study:

We conducted survey along with the questionnaire, which preliminary based on to documentation and survey of various services provided by those sites. Local villagers were interviewed for getting information on local belief and cultural services provided by the heritage sites. Details information regarding biodiversity components near the heritage sites, and disturbance were noted. The measures used may be different: for example, community studies may employ indices measuring aspects of biodiversity, whereas ecosystem studies utilize measures of standing vegetation or flow of water in channels. Similarly habitat function of the heritage sites can be measured by identified the different flora and fauna of the area. The NTFPs, collection and the productivity of terrestrial and aquatic systems for marketed foods, fuels or fibres can be used to measure the services of the sites. Besides that, we noted all the on-going threats which are affecting both the services and biodiversity.

Site A: Baramura Waterfall

A. Identification of criteria to be qualified as potential Biodiversity Heritage Sites (BHS): The BHS shall be identified in accordance with the following types of important criteria for qualify as BHS:

1.1 Areas that contain a mosaic of natural, semi-natural, and manmade habitats, which together contain a significant diversity of life forms:

This site is situated in the west Tripura district, Teliamura R.D Block, near the village Hrangkhalpara, which is about 9 km from Assam-Agartala fall in the Baramura Reserve forest. The nearest village is *Fagulal* village surrounding by 4 km *charra*, which locally known as '*Sitakcharra* or *Siddichara'*. In the west side- Jumpuizilla, East side Hrankhwalpara, North, O.N.G.C point and South- Gomati district is situated. The charra is originated from the water fall which is located at $23^0$45'56.1" N and $91^0$35'01.1"E (**Figure 1**). This water fall is about 50 feet in height and almost having the perennial water flow in the stream (**Figure 2**). Along the 4 km of stretch about seasonal 15 water channels joined throughout the chara. Natural forest areas situates especially at the direction from North-east to South west, which represents diverse flora and fauna. The locational details of the Baramura Waterfall are given in **Table 1**. The nearest village Fagulal Keipengpara, about 35 families are dwelling, with more than 320 members. The main source of livelihood is jhum cultivation, timber extraction from the nearby forest area (Mostly Shegun) and Horticrops like Banana, Citrus, beetle nut etc. Previously the area was known as "Sirbuk" means Female and the place was

shaking, so Forefather named it "Step Shaking" or "Sirbuk". People replied that one storey is behind this place. Long back one couple did suicide near the water fall, due to restriction imposed by the villagers. The couple belonged to Halam community. Both of them suicide near two different waterfalls so there are two names. "Nupang" means Female waterfall and "Pasal" means male water fall. Later on the whole area declared as "Lungswangmune" means "Sorrow area". This story was also embodied on the rock, but slowly it disappears with the time. The script was English and Bangla.

Table 1: Showing the locational details of the Baramura Waterfall.

Sl No	Latitude	Longitude	Landmark
1.	23°46'08.8" N	91°35'01.9"E	Chara starting point
2.	23°45'53.4" N	91°34'52.8"E	Next point – water channel
3.	23°45'51.0" N	91°34'47.8"E	Next point- water channel
4.	23°45'50.1" N	91°34'43.9"E	Next point- water channel
5.	23°45'56.1" N	91°35'01.1"E	Location of water fall
6.	23°45'32.0" N	91°34'34.2"E	Location of second waterfall

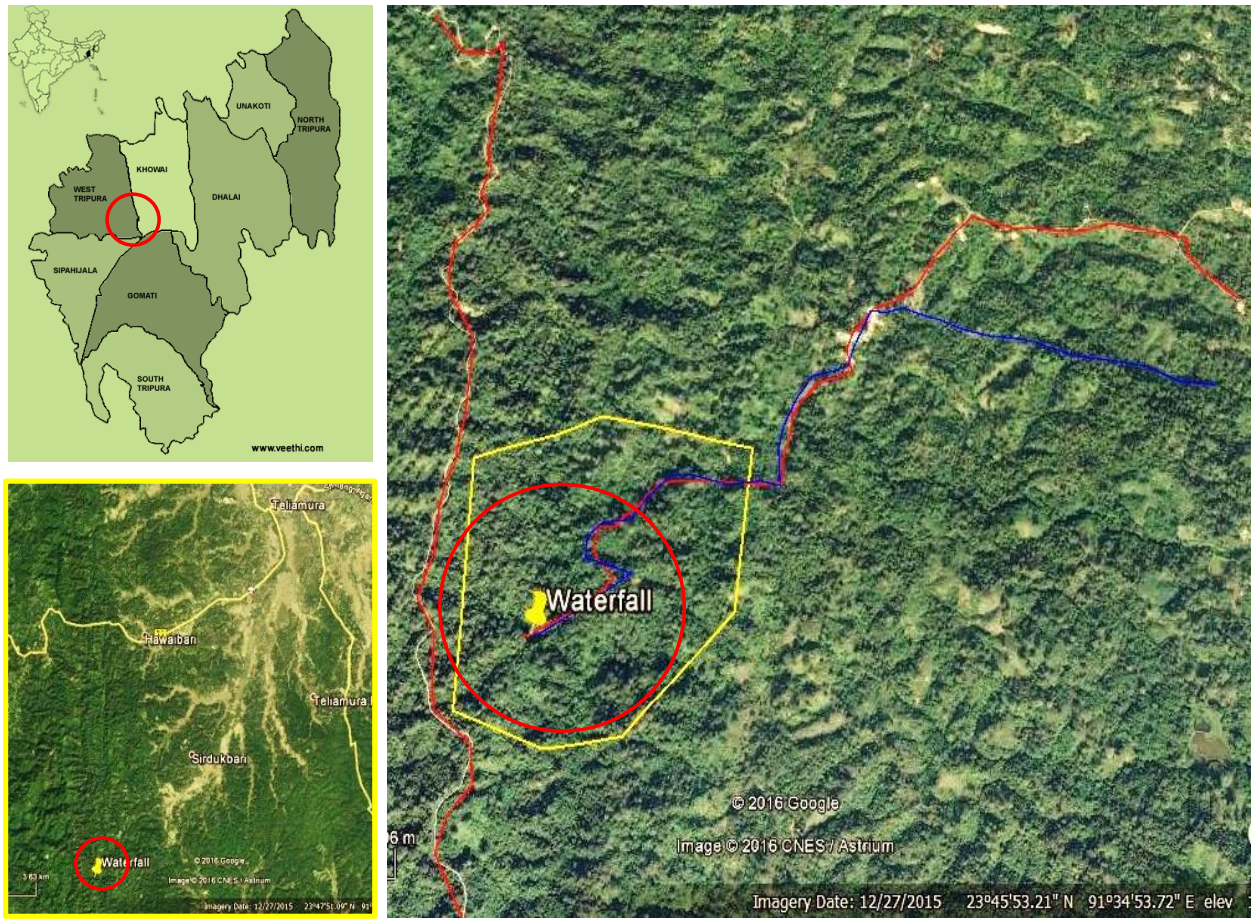


Figure 1: Locational details of the Baramura Waterfall

Figure 2: Showing the potential BHS of Tripura, Baramura Waterfall

1.2 Areas that contain significant domesticated biodiversity component and /or representative agro-ecosystems with on-going agricultural practices that sustain this diversity: Local community (Hrankhal) are still practicing Jhum cultivation along with several cultivated and semi-wild varieties of crops as agro-forestry components. For instance, **Figure 3** showing cleared forest for Banana+Papaya+rice based agro-forestry.

Figure 3: Showing cleared forest for Banana+Papaya+rice based agro-forestry plot.

1.3 Areas that are significant from a biodiversity point of view as also are important cultural spaces such as sacred groves/trees and sites, or other large community conserved areas: Baramura Reserved Forest is distributed over an area of 522.5 hectare in the West Tripura district. Forest of the sites are are mainly moist deciduous and a checklist of flora are given in **Figure 4, Figure 6 and Appendix – I.**

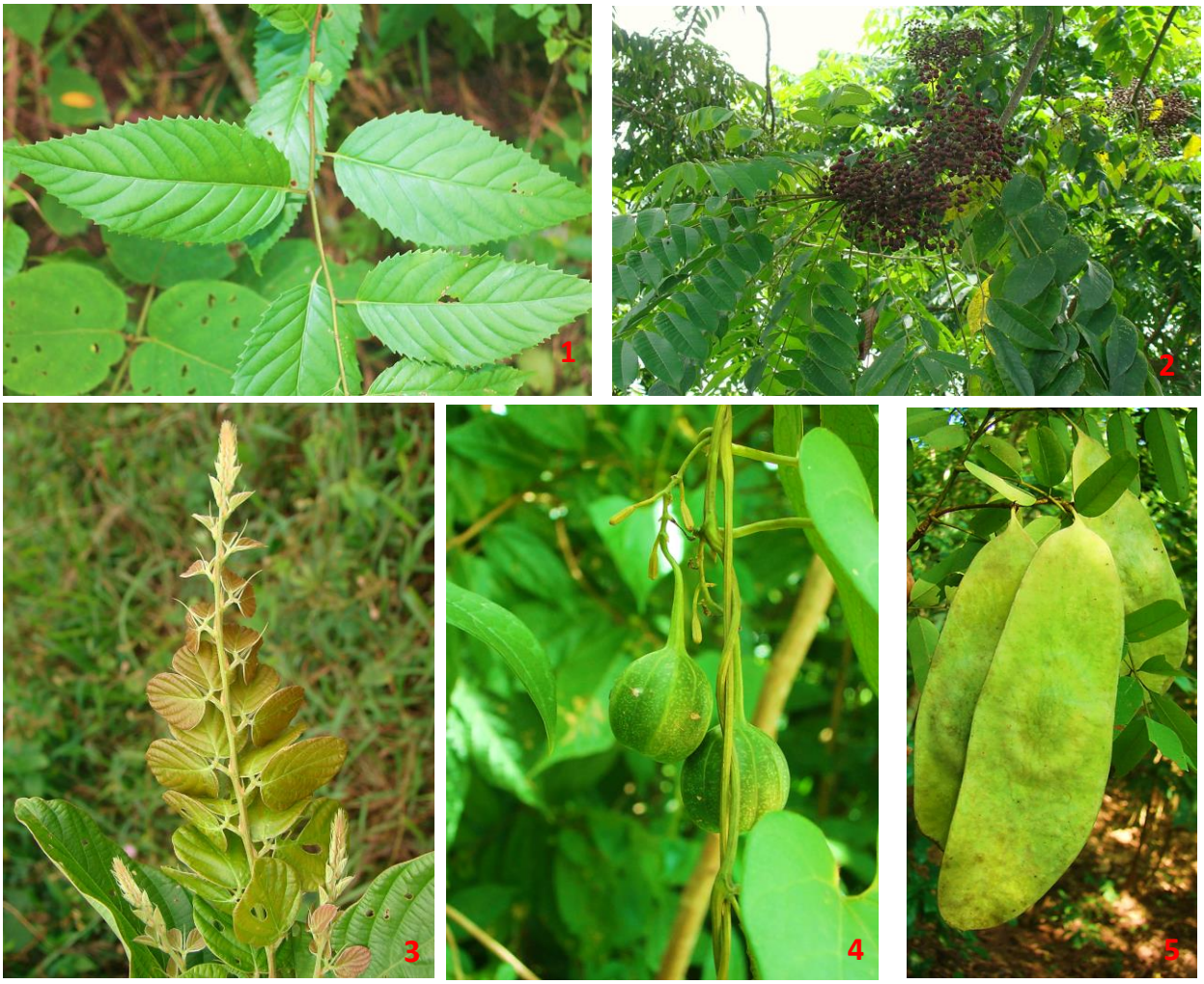


Figure 4: Showing floristic diversity of the site. 1. *Maesa indica (Roxb.) DC ., 2. Zanthoxylum limonella Alston., 3. Flemingia strobilifera (L.) W.T.Aiton., 4. Aristolochia tagala Cham., 5. Dalbergia volubilis Roxb.*

Fungal diversity: During our survey we found several macro-fungus species within the vicinity of Baramura water fall. These species was mostly abundant on the dead wood log lying near the water channel. The flow of water in the channel mainly determines the survival of the most fungi. Hence, this site have the potential to conserve less known macro-fungus diversity of the state. **Figure 5,** showing some fungus species observed in the field.

Figure 5: Different types of fungi that grow on dead wood. Common in more forested areas seen growing on fallen logs and dead trees. *1. Pleurotus sp., 2. Lentinus sp., , 3. Microporus sp., , 4. Geoderma sp., , 5. Lactarius sp., 6. Polyporus sp.,*

1.4 Areas including very small ones that offer refuge or corridors for threatened and endemic fauna and flora, such as community conserved areas or urban greens and wetlands: Wildlife Habitat: As per the secondary information collected from the locals (**Table 6**), this is the habitat of Asiatic black bears and wild boar. Faunal diversity was observed very rich in the stream (**Figure 7**). This bioresources are locally sold into the market. This stream is a potential breeding ground for these fishes which habitat once destroyed due to siltation of rivulets (in the stony bed) and use of different kinds of herbicides and pesticides. Many of the fish or other aquatic species is now endangered. However, this site can be utilize for conservation of indigenous stream favoured aquatic fauna and having potential to rejuvenate the economics of local people through commercial pisiculture.

Table 4: Name and address of some local informants

Sl. No.	Name of Respondent
1.	Harish Hrangkhal Village: Debthang Hrangkhalpara P.O: N.K.R Hrangkhalpara P.S: Teliamura Khowai, Tripura Mobile: 8974872477
2.	Lalring Hrangkhal Village: Debthang Hrangkhalpara P.O: N.K.R Hrangkhalpara P.S: Teliamura Khowai, Tripura
3.	Paul Hrangkhal Village: Debthang Hrangkhalpara P.O: N.K.R Hrangkhalpara P.S: Teliamura Khowai, Tripura
4.	Bonte Hrangkhal Village: Debthang Hrangkhalpara P.O: N.K.R Hrangkhalpara P.S: Teliamura Khowai, Tripura
5.	Sampada Hrangkhal
6.	Chansajoy Hrangkhal

Figure 6: Showing some important flora of the site. *1. Erioglossum rubiginosum (Roxb.) Blume., 2. Ziziphus oenoplia (L.) Miller, 3. Argyreia capitata (Vahl) Choisy, 4. Schima wallichii (DC.) Korth.*

Figure 7: Showing some aquatic fauna found in the stream originated from this waterfall. *1. Palaemon sp., 2. Scylla sp., 3. Puntius gelius, 4. Channa gachua, 5. Pila polita*

Forest Products and rural livelihood: NTFPs are considered to be a particularly important source of income for poor households. Wild foods such as vegetable, fruit and bamboo shoots, fuelwood, fodder and thatch grass were found to be the most important NTFPs in that area (**Figure 8**). Local people also collecting soil from the stream for various domestic applications. Although, the right and concessions of forest products amongst the local people, whose sustenance depend on collecting NTFPs should be addressed properly. The harvesting and collection of products should be regulated and managed on sustainable basis.

Water flow and quality: Water reaches freshwater stores (lakes, rivers, aquifers) by a variety of routes, including direct precipitation, surface and subsurface flows, and human intervention. In all cases, the water quality is altered by the addition and removal of organisms and substances. The quantity of water (flow rate) and quality of water was considerably good. During our visit, we found that the water was directly consumed by the local people. Near the village the water from the stream was used for various purposes like cleaning, washing, irrigation, bathing etc (**Figure 9**).

Figure 8: Showing the different NTFPs harvested from the nearby area of waterfall. 1. Remains of Bamboo Shoot, 2. Rhizome, of Colocasia sp., 3. Soil for collection for polishing and colouring the mud-wall houses, 4. Different wild edible goods and, 5. Firewood stock.

Figure 9: 1. Women directly using the stream water, 2. Perennial water flow maintained by forests.

Tourism, cultural values and livelihood prospects: The place is having the potential of attracting tourist from the surrounding area and Agartala. Local people responded that the area is popular as picnic spot and student visit from the surrounding area is common phenomenon. But near this site, there is no shop of direct employment based on the water fall. About 800 -1000 people visit the place annually.

1.5 All kinds of legal land uses whether government, community or private land could be considered under the above categories: This area may be the part of Barmura-Deotamura RF

1.6 As far as possible those sites may be considered which are not covered under Protected Area network under the Wildlife Protection Act 1972 as amended: The part of Barmura-Deotamura RF

1.7 Areas that provide habitats, aquatic or terrestrial, for seasonal migrant species for feeding and breeding: See point 1.4 for details.

1.8 Areas that are maintained as preservation plots by the research wing of Forest department: Not properly maintain by Forest Department.

1.9 Medicinal Plant Conservation Areas: Based on the floristic composition and habitat nature, this site is very potential for conservation of local wild medicinal plants (**Figure 10**). It also important to hold those herbal resources to promote ethnobotany and plant based traditional knowledge.

On-going threats: The noticed threats to the waterfall were Jhum Cultivation, Fragmentation by pedestrial, Illegal wood logging, Hunting, Bamboo cutting; now people are going inside the forest as near the margin the resources are decreasing. Trace of human presence like Glass and plastic bottles, fire for cooking, bidi bud, wooden logs and unused flanks were documented **(Figure 11).** It is likely that a decline in the provision of wild timber, plant fibres and fuelwood will take place in proportion to the *decline in the forested area*. *Fragmentation*, however, may result in a much quicker decline in forest productivity than what would be expected given the total area of remaining forest. Climate change has also been implicated in increasing *forest fire risk* and the combined effects of fragmentation and climate change may conspire to prompt an abrupt increase in fire risk, which may be particularly devastating (and less likely to be reversible) in tropical rain forests, as species are not ecologically adapted to fire, and each fire event tends to increase the likelihood that future fires will take place.

Figure 10: Some medicinal flora of the site. 1. Glycosmis sp., 2. Castanopsis indica (Roxb. ex Lindl.) A.DC. ., 3. Smilax zeylanica L., 4. Combretum albidum G. Don.

Figure 11: Showing the different threats recorded near Baramura waterfall. 1. Jhum cultivation, 2. Illegal logging for timber, 3. Hunting, 4. NTFP collection, 5. Forest fire, 6. Plastic pollution by the visitors

PROPOSAL FOR DECLARATION OF BIOLOGICAL HERITAGE SITE UNDER BIOLOGICAL DIVERSITY ACT 2002
(For location outside the Reserve Forest, Wildlife Sanctuary and National Park)

1. Identification of Property:		
I.	State:	**Tripura**
II.	Name of the Site:	**Barmura Waterfall**
III.	Exact location (GPS Point):	**See Table**
IV.	Maps showing boundary of area proposed:	**See Figure**
V.	Area of site proposed for declaration (ha):	**150**
2 Justification for Declaration:		
I.	What is the significance of the proposed site?	• **The highest natural waterfall in Tripura** • **Critical Wildlife habitat** • **Rich in floristic Diversity** • **Habitat for many stream water favoured fauna**
II.	Why the declaration is proposed give justification.	• **The nearest village is Fagulal Keipengpara,** • **About 35 families are dwelling with more than 320 members.** • **The main source of livelihood is jhum cultivation, timber and fuelwood selling and NTFP extraction**
III.	Threat if any (give details):	• **Timber poaching** • **Hunting** • **Forest fire from Jhum** • **Habitat lose** • **Tourist pressure**
3 Description:		
b Present status of conservation:		**NA**
4 Management:		
I.	Ownership:	**Forest Department**
II.	Legal Status:	**RF**

III. Agency to manage the site after declaration.	**Forest Department**
IV. Name, Designation and address of responsible person for contact:	
V. Sources of expertise:	
5 Factors Affecting the Site	
I. Pressures on the site (Encroachment, Agriculture etc):	**Yes**
II. Environmental Pressures:	**NA**
III. Visitor / tourism pressures:	**Yes**
6 Documentation	
I. Photographs (submit if available):	**Yes**
II. Existing site management plans, if any:	**NA**
7 Opinion of other concerned stakeholders:	
8 Details of disputes if any on the site (give details):	
9 General remarks if any:	**See Conclusion and Recommendations**

Site B: Silaichari Cave

B. Identification of criteria to be qualified as potential Biodiversity Heritage Sites (BHS): The BHS shall be identified in accordance with the following types of important criteria for qualify as BHS:

2.1 Areas that contain a mosaic of natural, semi-natural, and manmade habitats, which together contain a significant diversity of life forms: A small *chara* name as "*Silamram Chara*" like cave river, goes to the cave starts near the Gislami English medium school (23^{0}13'48.5" N and 91^{0}45'42.8"E. After travelling around 2 km, the location of the cave is 23^{0}13'47.6" N and 91^{0}45'22.2"E (**Figure 12**). Around 3-4 small seasonal water channel was joining the chara from the both ends. The Silachari cave is situated near Kijunmogpara about 2 km away from the Silachari. There are two caves "*Aola*" mother and "*Simi*" Doughter. The mouth of cave is about 2.5 meter high and 3 meter width and about 70-80 meter depth. As per the local belief, the small cave, which is just opposite to big one, is not able to glorify. The size of the cave is increasing due to slow scratching of the soft sand stone by the nails of the bats. The nails of the bat are usually very sharp. Water coming out of the chara is very clean and directly consumed by the local people. The rock of the area near to cave was sandstone and flakes of mica or feldspar. Soil was ferruginous in origin with very low organic matter and clay content.

Table 8: Locational details of the Silachari Cave

Sl. No	Latitude	Longitude	Landmarks
1	23013'48.5" N	91045'42.8"E	Chara starts
2	23013'55.4" N	91045'31.6"E	Water channel meet-left side
3	23013'51.2" N	91045'26.1"E	Water channel meet-left side
4	23013'47.6" N	91045'22.2"E	Mouth of Cave

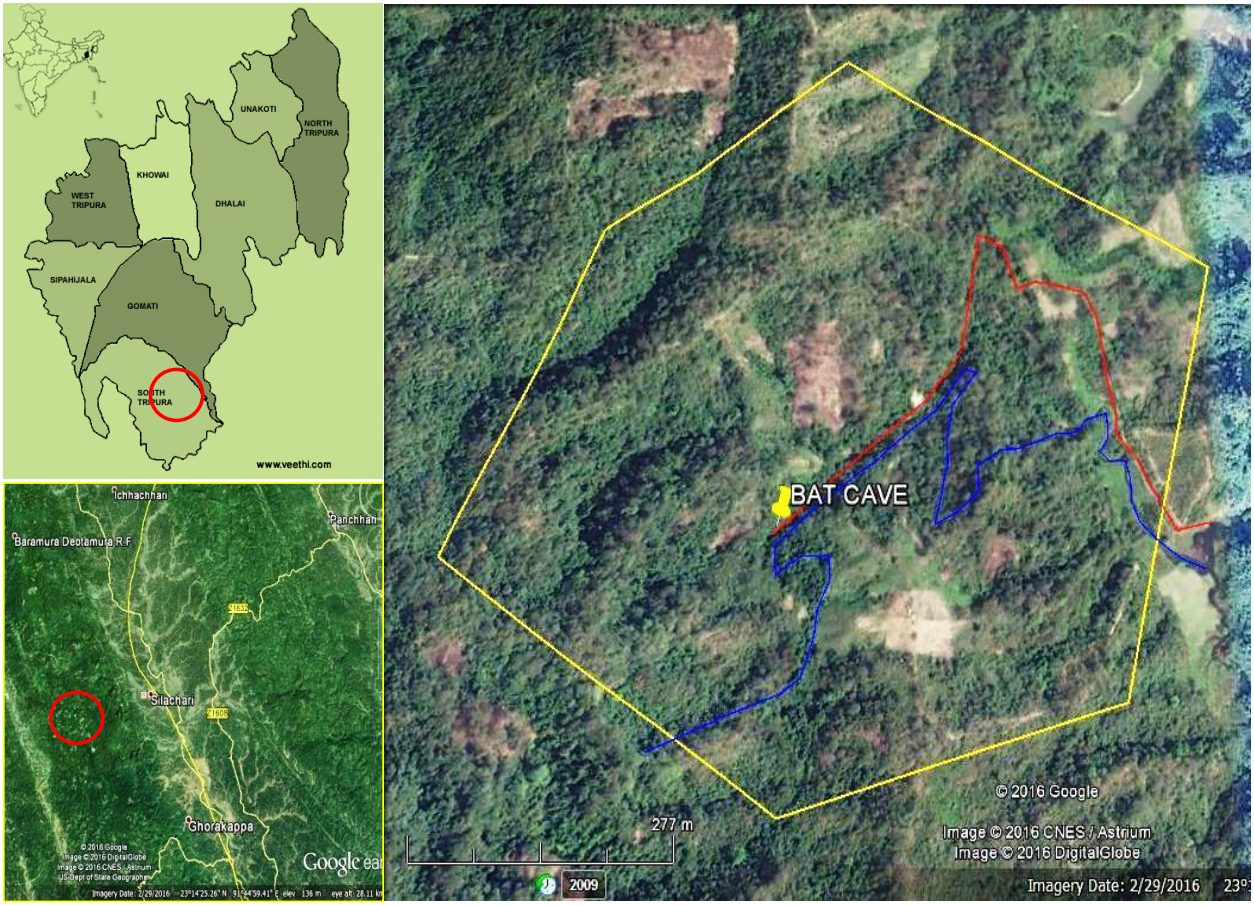


Figure 12. Map Showing the location of the Silachari Cave

Figure 13: Showing the entry of 'Silaguha' or Silachari Cave

Figure 14: Showing the water channel and structure of the cave. 1. water channel, 2. Cave entrance made up of sandstone, 3. Cave internal structure, 4. Slate stone, 4. Ritual activity and, 6. Clean water flowing over hard rock.

Figure 15: Showing inside cave environment. 1. Entry into the cave during survey, 2. & 3. Data collection, 4. Locals uses the stream water for drinking purposes

Figure 16: Some important flora of the same. *1. Bombax ceiba L., 2. Cordia dichotoma G.Forst., 3. Wendlandia wallichii Wight & Arn., 4. Glochidion multiloculare (Rottler ex Willd.).*

2.2 **Areas that contain significant domesticated biodiversity component and /or representative agro-ecosystems with on-going agricultural practices that sustain this diversity:** The proposed site is the part of Silachari Reserved Forest, which is about 1306.91 ha situated in South Tripura district. This LULC was having the lowest value of diversity. Vegetation is moist deciduous type and mostly is in degraded forms. Species of Urticaceae and Moraceae was the dominant family along

the stream side. Other important species observed were given in **Figure 16.** Ground was full of seedlings and saplings of different species. The caves wall composition was similar to the Baramura water fall. Five common species of fern were present.

2.3 Areas that are significant from a biodiversity point of view as also are important cultural spaces such as sacred groves/trees and sites, or other large community conserved areas: This 'Silaguha' is only the natural cave discovered in Tripura. Although, the cave is made up by sandstone, which may destroy by minor earthquake. But is represents the unique habitat for threatened mammals especially several species of bats. This cave is also an important cultural space. Since, many cultural services depend primarily on species diversity, and tend to concentrate on the large-bodied, charismatic plants, birds and mammals. Local Mog community offers flower and Pigeon in the mouth of cave. Mog community worships at the mouth of the cave, especially on the day of 'Budha purnima'. They belief that people with pure heart should enter into the cave otherwise they will fall in the trap by the god. The whole family goes for prayer. The material used for the pray was derived from the forest products e.g. flower was make up of bamboos. Hence, Mog community conserve this site as their cultural or traditional beliefs (**Figure 17).**

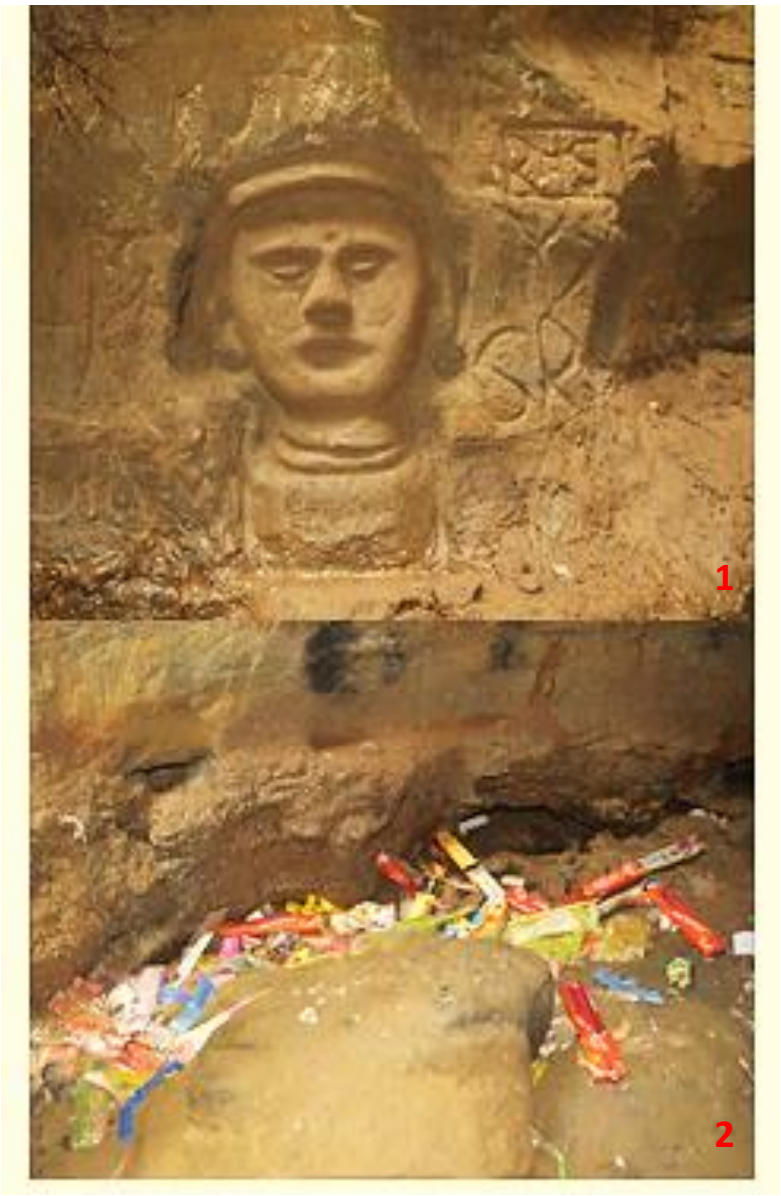


Figure 17: Showing cultural significance of the Cave, an ethno-religious practise which directly associated with the conservation of Cave and Cave Fauna (Bats)

2.4 **Areas including very small ones that offer refuge or corridors for threatened and endemic fauna and flora, such as community conserved areas or urban greens and wetlands**: This is only the refuge or corridors used by several threatened bat species of the state. There are 3-4 species using the inside habitat of cave (**Figure 18 & Figure 19**). According to the evidence observed in the filed this site also used by threatened Jangle Cat and Indian Porcupine. However, as per the

secondary information extracted from local inhabitants (Table 7) several important wildlife was seen around the cave viz. Clouded Leopard, monkey, Wild boar, deer etc. Infect, long ago this forest areas was the most favoured habitat for Sambar deer locally called "Kaleshwar'.

Figure 18: 1. Showing preferred habitat of threatened Chiroptera species of Tripura. 2 & 4. Megaderma lyra (Great False Vampire Bat), 3 & 5. Hipposideros lankadiva (Indian Leaf-nosed Bat)

2.5 **All kinds of legal land uses whether government, community or private land could be considered under the above categories**: Part of Silachari Reserved Forest, which is about 1306.91 ha situated in South Tripura.

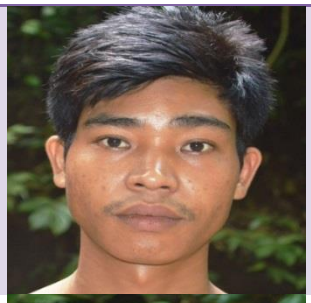
2.6 **As far as possible those sites may be considered which are not covered under Protected Area network under the Wildlife Protection Act 1972 as amended:** Not represented any Wildlife Sanctuary.

2.7 Areas that provide habitats, aquatic or terrestrial, for seasonal migrant species for feeding and breeding: The cave is only the breeding ground used by several threatened bat species of the state. However, stream flowing in front of the cave is also serves unique habitat for several aquatic fauna.

2.8 Areas that are maintained as preservation plots by the research wing of Forest department: Part of Silachari Reserved Forest, which is about 1306.91 ha situated in South Tripura. Monitoring by Silachari Range Office and Bagafa Forest Division.

2.9 Medicinal Plant Conservation Areas: The forest adjacent to the cave represents several unique traditional ethnomedicinal plants **Figure 20**.

Table 8: Showing the name and address of local informants

Sl No	Name	Address	Photo
1	Kala Mog	S/O: Atushi Mog Age: 25 years Village: Kijunmogpara P.S: Silachari Silachari, South Tripura M. No: 9612141103	
1	Raju Mog	S/O: Manjai Mog Age 20 Village: Kijunmogpara P.S: Silachari Silachari, South Tripura M.No:7085724765	
3.	Presenjit Mog	Age: 23 years Village: Kijunmogpara P.S: Silachari Silachari, South Tripura	
4	Anjosai Mog	Age: 20 years Village: Kijunmogpara P.S: Silachari	

		Silachari, South Tripura
5	Bosu Mog	Age: 22 years Village: Kijunmogpara P.S: Silachari Silachari, South Tripura
6	Nazrul Mog	Age: 35 years Village: Kijunmogpara P.S: Silachari Silachari, South Tripura
7	Thailachai Mog	Age: 24 years Village: Kijunmogpara P.S: Silachari Silachari, South Tripura
8	Suman Mog	Age: 25 years Village: Kijunmogpara P.S: Silachari Silachari, South Tripura

Figure 19: Showing the potential faunal diversity near Silachari Cave. 1. Dragonfly, 2. Lycodon aulicus , 3. Hipposideros lankadiva (Indian Leaf-nosed Bat), 4. Channa gachua, 5. Carcinus sp., 6. Water spider

Figure 20: Showing some important medicinal plants of the site. 1. *Terminalia bellerica Roxb., 2. Saraca asoca. (Roxb.), 3. Symplocos racemosa Roxb. 4. Ardisia colorata Roxb.*

Figure 21: Showing several on-going disturbances and major threats. 1. Picnic fire, 2. & 3 Plastic pollution by tourist, 4. NTFPs (Bamboo) collections

On-going major threats: During our filed survey we observed that Jhum cultivation is still going on in this site. Illegal logging for timber and fuelwood is also occurring. Besides that, collection of Bamboo and other NTFPs, forest encroachments etc. were the major threats were recorded. However, Illegal hunting is popular, i.e. hunting of Porcupine and Deer is done for Rs. 500 by licensed gun. Occurrence of invasive species was also noted (**Figure 21).**

PROPOSAL FOR DECLARATION OF BIOLOGICAL HERITAGE SITE UNDER BIOLOGICAL DIVERSITY ACT 2002
(For location outside the Reserve Forest, Wildlife Sanctuary and National Park)

1. Identification of Property		
I.	State:	**TRIPURA**
II.	Name of the Site:	**Silachari Cave**
III.	Exact location (GPS Point):	**23013'47.6" N 91045'22.2"E**
IV.	Maps showing boundary of area proposed:	**See 2.1**
V.	Area of site proposed for declaration (ha):	**100ha**
2 Justification for Declaration:		
IV.	What is the significance of the proposed site?	• **Only natural Cave of Tripura** • **Unique habitat for several threatened Cave bats species in Tripura** • **Rich Floristic diversity** • **Ethno-religious or cultural significance** • **Critical habitat for rare wildlife** • **Stream rich in aquatic fauna** • **Multi ecosystem services**
V.	Why the declaration is proposed give justification.	• **To conserve threatened bat habitat** • **To encourage ethno-ecology in Tripura** • **To protect habitat for rare wildlife** • **To continue multi ecosystem services provided by stream and adjacent forest**
VI.	Threat if any (give details):	• **Jhum cultivation** • **Illegal logging** • **Hunting** • **Tourist visit** • **Invasive species** • **Forest Encouragements**
3 Description:		

b Present status of conservation:	**Not Under RF categories**
4 Management:	
VI. Ownership:	**Govt. of Tripura**
VII. Legal Status:	**Not Under RF categories**
VIII. Agency to manage the site after declaration.	**NA**
IX. Name, Designation and address of responsible person for contact:	
X. Sources of expertise:	
5 Factors Affecting the Site	
IV. Pressures on the site (Encroachment, Agriculture etc):	**YES**
V. Environmental Pressures:	**NA**
VI. Visitor / tourism pressures:	**YES**
6 Documentation	
III. Photographs (submit if available):	**YES**
IV. Existing site management plans, if any:	**NA**
7 Opinion of other concerned stakeholders:	**NA**
8 Details of disputes if any on the site (give details):	
9 General remarks if any:	**See the conclusion and recommendations**

Proposed Site C: Unakoti

C. **The criteria for identification of Biodiversity Heritage Sites (BHS):** The BHS shall be identified in accordance with the definition above. Accordingly the following types of areas of biodiversity importance shall qualify as BHS.

3.1 **Areas that contain a mosaic of natural, semi-natural, and manmade habitats, which together contain a significant diversity of life forms:** Unakoti is archaeological site of Tripura situated in the north district, 180 km from capital Agartala (**Figure 22**). It is a profusion of rock-cut images, belonging to 11-12th century A.D. in open air art gallery surrounded by lush green and bush. There are about 60-70 small, medium to large number of stone creature, figures of Hindu gods & goddesses engraved in rock. The famous bas relief sculptures of Unakoti carved on the vertical rock cliffs display colossal sculptures of Siva head which is more than 6m height(**Figure 23**). According to mythology, the dawn broke out while the craftsman had just finished making of one crore images of Lord Shiva, Vishnu, Hara-Gauri, Ganesh etc. Unakoti is termed as "Shaiva-Tirtha" which is visited by thousands of pious people from all over the region particularly during '*Ashokastami Mela*' in March-April to take a holy bath (**Figure 24**). Besides the famous architectonical sculptures, the proposed site is dominated by moist deciduous vegetation providing several ecosystem services. This site is managed by Archaeological Survey of India, Guwahati Circle, with 100 acre of the demarcated boundary.

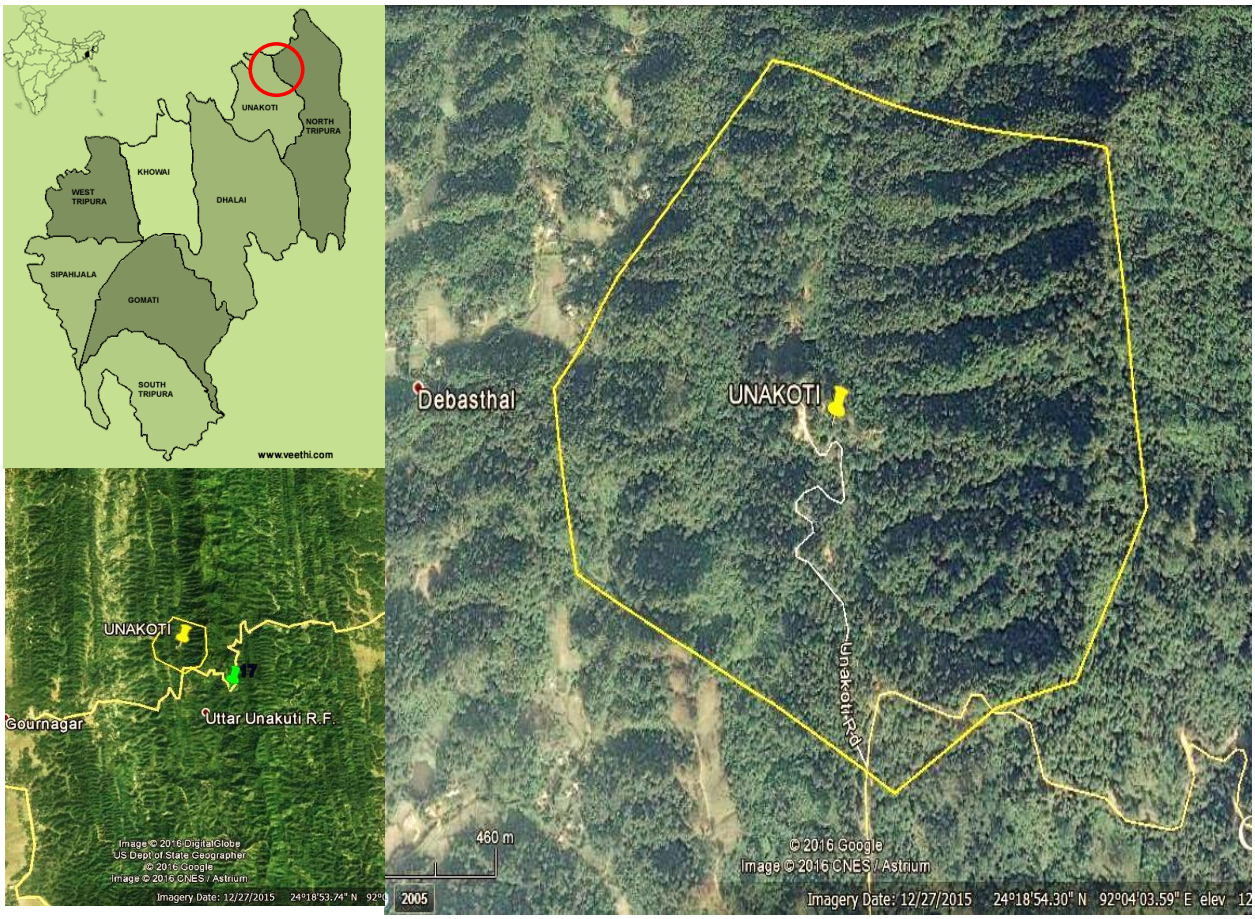


Figure 22: Map Showing the location of Unakoti

Figure 24: Showing Natural land scape of Unakoti

Figure 25: Showuing the dense vegetation with rich floristic elements of Unakoti

Figure 26: Some important flora of the site. ***1. Bridelia stipularis (L.) Blume, 2. Sterculia vilosa L., 3. Engelhardtia spicata Blume, 4. Lithocarpus spicata Rehder***

Figure 27 : Showing face sculpture of Lord Shiva, the largest face in India.

Figure 28: Showing sacred tress worships by local tribal

3.2 **Areas that contain significant domesticated biodiversity component and /or representative agro-ecosystems with on-going agricultural practices that sustain this diversity:** The surrounding area has characteristics features of rich natural vegetation (**Figure 24 & 25**), topographically four high altitudinal areas which surrounds the total archaeologically important monuments, stream flow, various sizes of scattered stone and sacred trees. There is small check dam situated at the vicinity and in surrounding forest small scale agroforestry plots are exist. Two small stream flow by the side of the check dam, which known as "Unakoti cherra" and "Bagha Chara" are flowing between two rocks of Lord Shiva face. Grazing, honey collection, Banana plantation and Areca nut based agro-forestry practice, fuel wood and bamboo shoot collection is the common livelihood option. Howerer, floral diversity of the site is very unique and rich interms of species composition (**Figure 26**).

3.3 **Areas that are significant from a biodiversity point of view as also are important cultural spaces such as sacred groves/trees and sites, or other large community conserved areas:** This site is most important cultural spaces found in Tripura (**Figure 27**). All the sculptures are has its own story and traditional belief. The Face of Lord Shiva is considered as the largest Sculpture face in India. Many big trees are worships by local people just for their religious belief (**Figure 28 & 29**). The style of stone art is totally different from classical ones, the decoration and anatomy of the sculptures are reflected tribal cultural spaces (**Figure 30).** Many of the sculptures and stones placed just under the tree, which are showing example of ethno-religious aspects of the site and a link between religious faith and biodiversity conservation. Because, those sacred trees are never permit to cut. Since, it is holly place many ornamental and medicinal plants have been introduced time to time within this area and all are conserving only for their religious beliefs.

Figure 29: Showing the ethno-religious aspects of the site and a link between religious faith and biodiversity conservation.

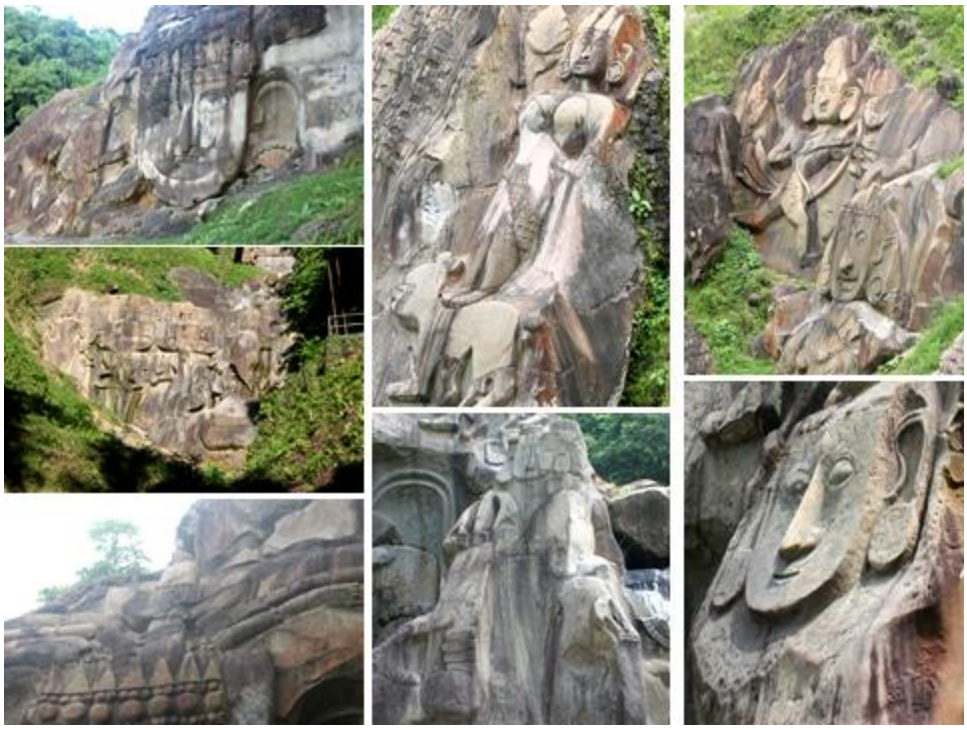


Figure 30: Several stone sculptures having high value of and cultural spaces and religious belief

3.4 **Areas including very small ones that offer refuge or corridors for threatened and endemic fauna and flora, such as community conserved areas or urban greens and wetlands:** The forest is very rich in diversity, especially the ground flora having some important botanical elements which are very unique in nature (**Figure 31**). There are two small streams named 'Unakoti Cherra' and 'Bagha Cherra' originated from uphill side of flows down throughout the year (**Figure 32**). This riverine type aquatic ecosystem plays a vital role for preservation of several aquatic flora and fauna, also source of water used for irrigation (**Figure 33**). This source of water also used to drink by visitors after treatment. Based on secondary information, the site is also offers suitable habitat for many threatened wild fauna viz. Leopard, Primate, Bear, Deer, Wild Hen, Stone Lizard, Hornbill, Hill Mynah etc. This site also offer unique habitat for mixing wild, semi-wild and domesticated plants **(Figure 34).**

Figure 31: Potential habitat for rare flora and fauna. 1. Pila sp. in natural streams, 2. Rare butterfly, 3. Hill maynah, 4. Spider, 5&6 Grasshoppers, 7. Rauvolfia serpentina (L.) Benth. ,8. Trichosanthes sp

Figure 32: Stream flow of Unakoti

Figure 33: Unique habitat of Bryophytes and other lower floral elements

3.5 **All kinds of legal land uses whether government, community or private land could be considered under the above categories:** This area is partially maintained by Archaeological Survey of India and Tripura Forest Department, only the sculptured area. Although, a small Eco park and a Guest house is exist on the entry of road side.

Figure 34: Unique habitat for mixing wild, semi-wild and domesticated plants

3.6 **As far as possible those sites may be considered which are not covered under Protected Area network under the Wildlife Protection Act 1972 as amended:** Not the part of any Wildlife sanctuary

3.7 **Areas that provide habitats, aquatic or terrestrial, for seasonal migrant species for feeding and breeding:** May be the site is used for some wildlife species frequently migrated from southern part of Uttar Unakoti RF.

3.8 **Areas that are maintained as preservation plots by the research wing of Forest department:** Not maintained.

Figure 35: On-going threats for illegal timber collection

3.9 **Medicinal Plant Conservation Areas:** *This site is having several important medicinal plants viz. Rauvolfia sarpentina, Costus speciosus, Phyllanthus fraternus, Leea aquta, Morinda tinctoria etc.*

Present Threats: The sites are partially maintained by ASI, but their efforts are targeted on the sculpture only. Villagers living surroundings the sites frequently use the adjacent forest for multiple product extraction. Although, logging, firewood and NTFPs collection are the major threats to the biodiversity of the site (**Figure 35**). Many valuable sculptures are eroding (**Figure 36**) and we are losing this precious cultural heritage due to negligence of the local bodies.

Figure 36: Many valuable sculptures are eroding and destroying due to lake of management

PROPOSAL FOR DECLARATION OF BIOLOGICAL HERITAGE SITE UNDER BIOLOGICAL DIVERSITY ACT 2002
(For location outside the Reserve Forest, Wildlife Sanctuary and National Park)

1. Identification of Property		
VI.	State:	**Tripura**
VII.	Name of the Site:	**Unakoti**
VIII.	Exact location (GPS Point):	**24°18'58.9"N 92°04'01.6"E**
IX.	Maps showing boundary of area proposed:	**Given**
X.	Area of site proposed for declaration (ha):	**100 acr**
2 Justification for Declaration:		
VII.	What is the significance of the proposed site?	• **Cultural and religious significance** • **Example of Ethno-religious aspects** • **Sacred trees and stones** • **Rich forest flora and fauna** • **Source of natural stream flow has diverse ecosystem services** • **Site of semi-wild, wild and domesticated ornamental plants**
VIII.	Why the declaration is proposed give justification.	**Unakoti is an important archaeological site of Tripura, which is not only significant from the point of cultural value, but this area also potential for conservation of biodiversity, ASI are not manage properly, several sculptures and stones are eroding and broken, which needs to be preserve to value the local religious emotions.**
IX.	Threat if any (give details):	• **Forest clearing for plantation, timber and fuelwood** • **NTFPs collection** • **Frequent tourist visit** • **Plastic pollution** • **Grazing** • **Fish poisoning by pesticide in the streams**

3 Description:	
b Present status of conservation:	**Partially by ASI**
4 Management:	
XI. Ownership:	**ASI**
XII. Legal Status:	**May the part of Uttar Unakoti RF**
XIII. Agency to manage the site after declaration.	
XIV. Name, Designation and address of responsible person for contact:	
XV. Sources of expertise:	
5 Factors Affecting the Site	
VII. Pressures on the site (Encroachment, Agriculture etc):	**Encroachment for agroforestry**
VIII. Environmental Pressures:	**NA**
IX. Visitor / tourism pressures:	**High**
6 Documentation	
CI. Photographs (submit if available):	**Yes**
CII. Existing site management plans, if any:	**NA**
7 Opinion of other concerned stakeholders:	
8 Details of disputes if any on the site (give details):	
9 General remarks if any:	

Proposed Site D: Betlingshib and its surroundings.

D. The criteria for identification of Biodiversity Heritage Sites (BHS): The BHS shall be identified in accordance with the definition above. Accordingly the following types of areas of biodiversity importance shall qualify as BHS.

4.1 Areas that contain a mosaic of natural, semi-natural, and manmade habitats, which together contain a significant diversity of life forms: The forest of the area is characterised by: Betlingshib and its surrounding area forms the part of Jampui hills of the North District in Tripura (***Figure 37***). The area is popularly known for its high altitude compared to other parts of the state and Orange orchards. The forests of the study area are semi evergreen to moist deciduous and degraded *Jhum* forests with large portion dominated by secondary moist bamboo brakes. The soils are classified as fine loamy typic haplustalfs at the sites of moderately dense vegetation and loamy skeletal lithic/typic ustochrepts at the sites of sparse vegetation. The terrain is hilly and the elevation ranges from 200 m to 900 m. Due to the changes in altitude, topography and climatic conditions the vegetation is totally unique compared to mainland of Tripura State. The floristic elements are totally different from rest other forests of Tripura and showing similarities with Chitagoang hill of Bangladesh and Lusai hill of Mizoram (**Figure 38**). The hill ranges and the landscapes have great aesthetic values (**Figure 39**). Gradual replacement of such extensive natural forest by abandoned jhum and current agroforestry practice has been found.

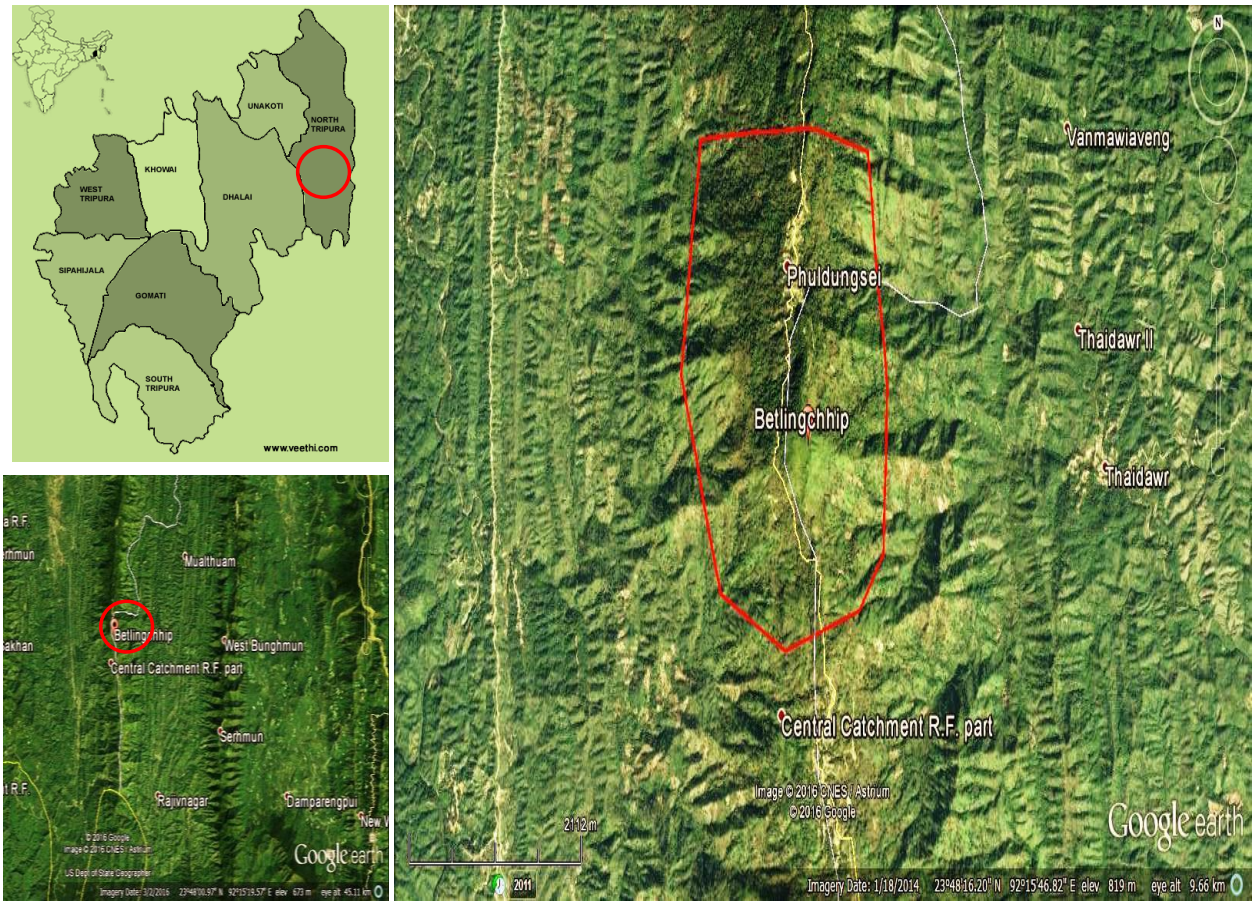


Figure 37: Showing location of the Betlingshib

Figure 38: Showing the dense semi-evergreen forest patch at Betlingshib

Figure 39: Showing different hill ranges having high aesthetic and floristic value.1. View of Mizorum from Jampui hill, 2. The Betling sibh, 3. Rich florest of Vanghmun, and Jhum fallows of hills

4.2 Areas that contain significant domesticated biodiversity component and /or representative agro-ecosystems with ongoing agricultural practices that sustain this diversity: This area and it surrounding is known for diverse agro-ecosystems. Especially, orange orchards are unique in this region. Although, this area is dominated by Lusai tribe practicing traditional agroforestry which is a sustainability enhancing the traditional methods for conservation of wild, semi-wild and cultivar germplasm in combination of both forestry and agriculture (**Figure 40**). Followings are some of the current pattern of agro-ecosystem model can be found in this area-

i) Areca nut + orange,
ii) Areca nut + orange + betel leaf

iii) Areca nut + pineapple + banana
iv) Areca nut + coffee
v) Areca nut+ coffee + black piper
vi) Banana + lemon + jackfruit + parkia
vii) Banana+ pineapple + maize + rice

Figure 40: Showing some unique agro-ecosystem models of the area. 1 Coffee based, 2. Banana based, 3. Areca nut based and, 4. Orange based

4.3 Areas that are significant from a biodiversity point of view as also are important cultural spaces such as sacred groves/trees and sites, or other large community conserved areas: The climatic conditions and high altitudinal gradient has resulted in a variety of floral elements which distribution is very distinct from other sites and restricted in the same proposed area. Semi-evergreen forest patches in this area is dominated by Lauraceae and Fagaceae . The plant resources of Jampui Ranges

were studied and analysed by extensive field survey during April 2009 to July 2010 and ten new additional tree species was recorded for the "Flora of Tripura State" (*Majumdar et al.* 2012). Indian Butter Tree at very low elevation was discovered and proposed for wide plantation through an agroecosystem model (Majumdar et al. 2011). Diverse agro-ecosystem associated with traditional practices helps to conservation of some very important semi-wild crops. Besides diverse natural forest of Jampui hills supports very unique habitat for diverse Orchids, Zinger and Cane (Rattan) species **(Figure 41)**. Rich in several wildlife especially Herpatofaunal diversity**(Figure 42 and 43)**, Insects and butterfly species Habitat of many Red listed plant (*Hidnocarpus kurzii , Mesua ferra* etc.) including highest floristic diversity compare to other forests of the state.

Figure 41: Showing unique floristic traits of the site. 1. *Calamus sp., 2. Amomum sp., 3. Dendrobium Chrysotoxum, 4. Mesua ferrea Linn, 5. Hydnocarpus kurzii (King) Warb.*

4.4 Areas including very small ones that offer refuge or corridors for threatened and endemic fauna and flora, such as community conserved areas or urban greens and wetlands: This site is very rich in both floral and faunal diversity. It is the only corridors for migration of wildlife between Tripura and Mizoram. Among the wildlife, Deer, Leopard, Wild Boar, Spectacle monkey and Hoolock gibbons etc. frequently seen by the local inhabitants. Besides that, being a high altitudinal area this habitat is used by several unique reptile, insects, birds and mammals (**Figure 42 & 43**).

Figure 42: Showing potential herpatofaunal diversity of the site. 1. Rhabdophis subminiatus, 2. Fejervarya pierrei , 3., Microhyla ornata , 4 & 5. Japalura sp., 6. Euphlyctis cyanophlycti , 7. Eutropis sp., 8. Japalura sp.,

Figure 43: Showing potential faunal diversity of the site. ***1. Mud crab, 2. Indoplanorbis sp., 3. White Stink Bug, 4. Butterfly larva, 5. Butterfly, 6. Moth larva, 7. Small blue bird, 8. Ninox scutulata***

4.5 All kinds of legal land uses whether government, community or private land could be considered under the above categories: Part of Central Catchment Reserve Forest

4.6 As far as possible those sites may be considered which are not covered under Protected Area network under the Wildlife Protection Act 1972 as amended: Not the part of any wildlife sanctuary

4.7 Areas that provide habitats, aquatic or terrestrial, for seasonal migrant species for feeding and breeding: It is part of Central Catchment Reserve Forest and only transition area for wildlife of very low elevation (Tropical)

and high altitude (Sub-tropical). Although, this is the corridor between Tripura and Mizoram State and distinctly an ecologically suitable habitat for fauna favoured the semi-evergreen forest to moist deciduous forest with bamboo brakes. As per secondary information the proposed site hoolock gibbons, leopard and wild boar (*Sus scrofa*) were supposed to migrate from one site to another site either sharing habitat of the same community or subsequently migrate to the adjacent forest in Mizoram.

4.8 Areas that are maintained as preservation plots by the research wing of Forest department: Not well protected as Forest Range Office situated far at Vanghmun and due to poor road connectivity and inaccessible hilly areas.

4.9 **Medicinal Plant Conservation Areas:** Due its high floristic nature the hilly terrains of Jampui Ranges harbour diverse medicinal plants species.

Figure 44: Showing major threats for biodiversity in Betlingshib

Existing Threats: This area is inhabited by Lusai and Darlong community. They practise Jhum cultivation in accordance with several agroforestry systems. Being the topography as hilly terrain and water scarcity do not permit for settle agriculture and horticulture in this area. Water scarcity is become fragile especially during dry season and people suffering for drinking water crisis. Extensive jhum cultivation and migration of Chakmas from Mizoram created huge pressure on the forests in this area. Hence, most of the forests areas were converted into degraded forms of jhum fellows. Collection of forests resources for basic livelihoods by surrounding community are increasing for timber, firewood, NTFPs and bamboo (**Figure 44**). Hunting occurrence is also sporadically occur by licence gun.

PROPOSAL FOR DECLARATION OF BIOLOGICAL HERITAGE SITE UNDER BIOLOGICAL DIVERSITY ACT 2002
(For location outside the Reserve Forest, Wildlife Sanctuary and National Park)

1. Identification of Property		
XI.	State:	**Tripura**
XII.	Name of the Site:	**Betlingshib of Jampui hill ranges**
XIII.	Exact location (GPS Point):	**Lat. 23°48'21.1"N, Long. 92°15'40.3"E**
XIV.	Maps showing boundary of area proposed:	**Attached**
XV.	Area of site proposed for declaration (ha):	
2 Justification for Declaration:		
X.	What is the significance of the proposed site?	**i) Geographical/topographical significance: The highest peak of Tripura (Betlingshib) allows unique habitat ecosystem** **ii) Aesthetic value: View of Mizoram and Chittagon hill tracts, other hills of Jampui, Orange orchards** **iii) Biodiversity Significance:**

	Highest floristic diversity in Tripura **iv) Conservation significance: suitable habitat for several redlisted flora and fauna** **v) Cultural significance: Diverse agro-ecosystem model**
XI. Why the declaration is proposed give justification.	**There is an urgency to conserve the biodiversity of this area. Although, this site is very unique in nature and maintaining existing landscapes will help to conserve several elements, recovery programme of threatened species and habitat restoration for ecological communities and to control emerging threats**
XII. Threat if any (give details):	**i) Unsustainable harvest of NTFPs** **ii) Natural forest of Jampui hill has been depleted drastically for jhum cultivation** **iii) Water crisis during dry season** **iv) Hunting of wildlife by indigenous tribe.** **v) Rage extension of invasive species especially from jhum fallows to forest**
3 Description:	
b Present status of conservation:	**Traditional conservation of crop varieties, medicinal plants through several agro-ecosystem,**
4 Management:	
XVI. Ownership:	**Patta Land**
XVII. Legal Status:	**The site comes under the jurisdiction of Kanchanpur Forest Division and Vanghmun Rage of Tripura Forest Department**
XVIII. Agency to manage the site after declaration.	**Tripura Biodiversity Board**

XIX. Name, Designation and address of responsible person for contact:	
XX. Sources of expertise:	
5 Factors Affecting the Site	
X. Pressures on the site (Encroachment, Agriculture etc):	**Forest encroachment for habitation, plantation**
XI. Environmental Pressures:	**NA**
XII. Visitor / tourism pressures:	**YES**
6 Documentation	
5 Photographs (submit if available):	**YES**
6 Existing site management plans, if any:	**NA**
7 Opinion of other concerned stakeholders:	
8 Details of disputes if any on the site (give details):	
9 General remarks if any:	**See conclusion and recommendation**

Proposed Site E: Debbari OR Chabimura

E. The criteria for identification of Biodiversity Heritage Sites (BHS): The BHS shall be identified in accordance with the definition above. Accordingly the following types of areas of biodiversity importance shall qualify as BHS.

5.1 Areas that contain a mosaic of natural, semi-natural, and manmade habitats, which together contain a significant diversity of life forms: Debbari or Chabimura or Debtamura located in South Tripura is another site in the state where magnificent rock carvings situated at the edge of Gumti River Bank. There are about 35 rock carvings can be found hich cattered in Chabimura of Debtamura. These include rock relief carvings of Shiva and Parvati, along with lesser idols of Durga as Mahishasura Mardini, Ganesh, and Kartikeya. These images date back to 15th-16th centuries. To reach the ite about 75 km from Agartala and 5 km from Amarpur (**Figure 45).**

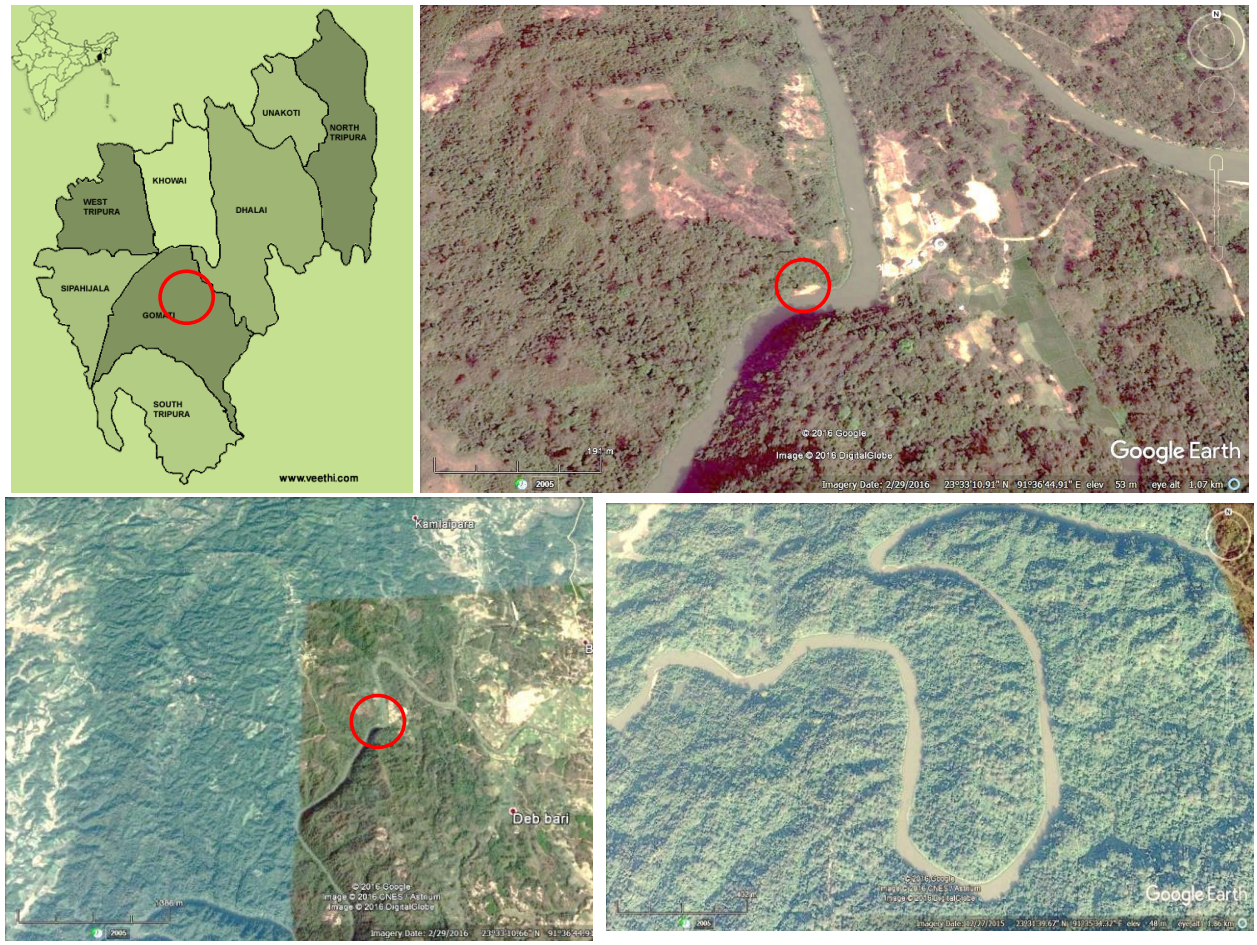


Figure 45: Showing location of the Debbari and banks of Gumti river

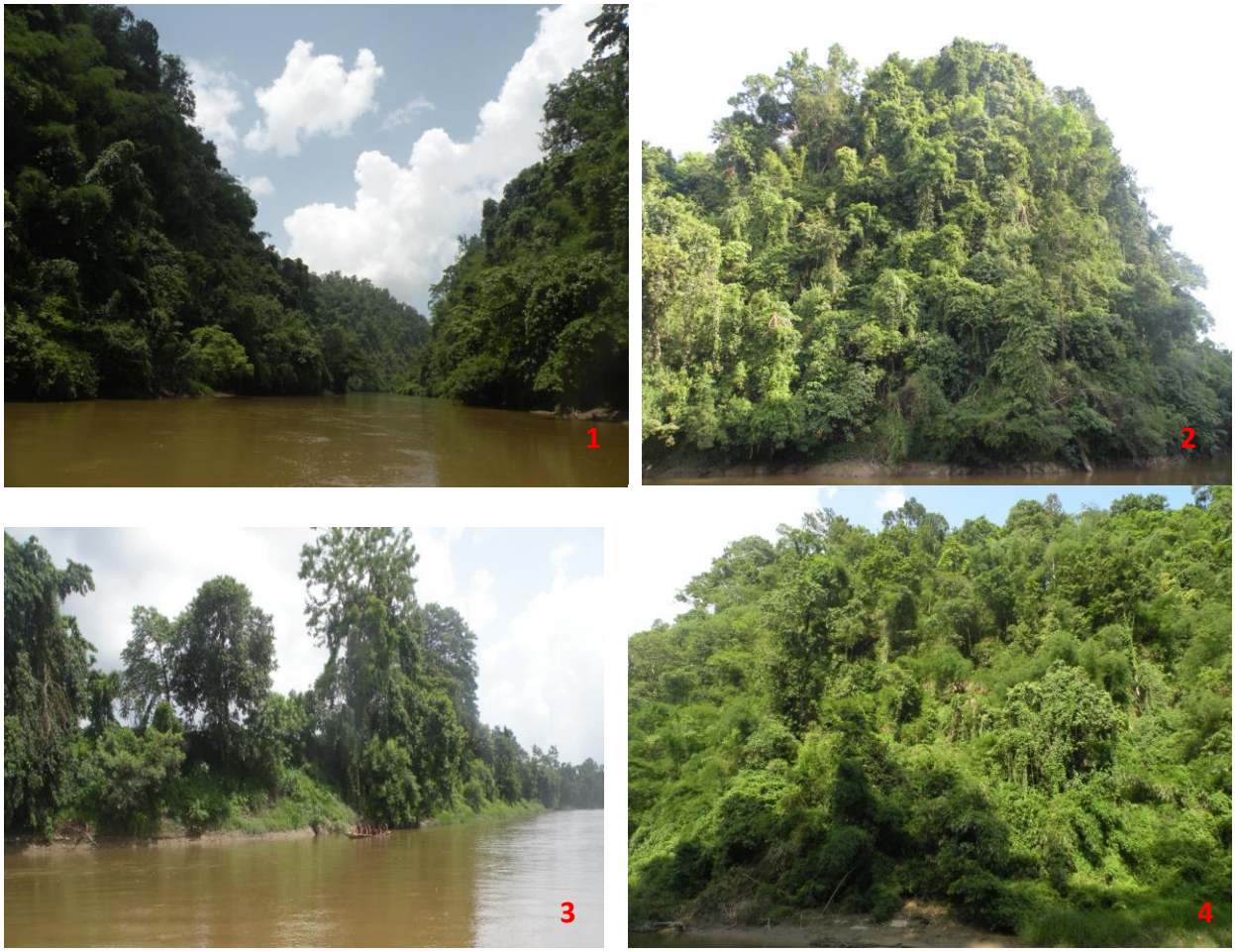


Figure 46: Showing Riverine forest ecosystems with rich flora and fauna

5.2 Areas that contain significant domesticated biodiversity component and /or representative agro-ecosystems with ongoing agricultural practices that sustain this diversity: This area and it surrounding is known for diverse forest ecosystems. Especially, the riverine forest situated at the bank of Gumti river (**Figure 46**). There forest is mainly semi-ever evergreen type dominated by Dipterocarpus turbinatus. Although, bank of the river is very productive and hence utilize by the local people for sustainable agriculture practices.

5.3 Areas that are significant from a biodiversity point of view as also are important cultural spaces such as sacred groves/trees and sites, or other large community conserved areas: The site has magnificent rock carvings situated at the edge of Gumti River Bank. There are about 35 rock carvings can be found in Chabimura of Debtamura ith rich cultural-religious importnace. These include rock relief carvings of Shiva and Parvati, along with lesser idols of Durga as Mahishasura Mardini, Ganesh, and Kartikeya. A variety of floral elements which distribution is very distinct riverine vegetation from on both sites of Gumti river. The Semi-evergreen forest patches in this area is harbour very unique plant diversity (**Figure 48 & 49**). The fertile bank of river is associated with diverse agro-ecosystems. Besides that, the river provide unique habitat for rare fih genetic diversity of the state. Habitat of many Red listed plant especially Dipterocarpus p., *Canarium bengalensis* and rich cane diversity **(Figure 50)**. Also rich in several wildlife especially Herpatofaunal diversity, Insects and butterfly species **(Figure 51).**

Figure 48: showing some important floral characteristic. 1. Castanopsis sp., 2. Ardisia solanacea Roxb., 3. Globba racemosa Smith., 4. Ficus racemous L.

Figure 49: Unique habitat of threatened plant of Tripura. 1. Knema angustifolia (Roxb.) Warb., 2. Hydnocarpus kurzii (King) Warb., 3 Cyathea gigantea (Wall. ex Hook.) Holttum.

Figure 50: Unique habitat of threatened Dhup tree (Canarium bengalensis) and cane (Rattan) resource of Tripura.

5.4 Areas including very small ones that offer refuge or corridors for threatened and endemic fauna and flora, such as community conserved areas or urban greens and wetlands: This site is very rich in both floral and faunal diversity. It is the only corridors for migration of wildlife between Tripura and Mizoram. Among the wildlife, Deer, Leopard, Wild Boar, Spectacle monkey and cave bat etc. frequently seen by the local inhabitants. Besides that, this is a unique habitat for fish genetic and other aquatic fauna. This only the natural breeding sites for many threatened fish species of Tripura, especially Pabda, Chingri, Ainn, Boal and Bata. (**Figure 51 & 52**).

Figure 51: Unique breeding habitat for threatened fishes of Tripura. 1. Ompok pabda and Barilius barila, 2. Anguilla bengalensis , 3. Macrobrachium rosenbergii, 4. Bagarius bagarius

Figure 52: Unique breeding habitat for threatened wildlife of Tripura. 1. Lesser short-nosed fruit bat Cynopterus brachyotis, 2. Tree frog, 3. Egg of junglefowl (Gallus gallus), 4. Butterfly, 5 & 6 Pugmark and faces of Elephant

5.5 All kinds of legal land uses whether government, community or private land could be considered under the above categories: Part of Deotamura Reserve Forest

5.6 As far as possible those sites may be considered which are not covered under Protected Area network under the Wildlife Protection Act 1972 as amended: Not the part of any wildlife sanctuary

5.7 Areas that provide habitats, aquatic or terrestrial, for seasonal migrant species for feeding and breeding: It is part of Deotamura Reserve Forest and only transition area for terrestrial and aquatic wildlife of Tripura.

5.8 **Areas that are maintained as preservation plots by the research wing of Forest department:** Not well protected as Forest Range Office situated far at Amurpur and due to poor road connectivity and inaccessible areas.

5.9 **Medicinal Plant Conservation Areas:** Due its riverine floristic nature the bank of Gumti harbour diverse medicinal plants species.

Existing Threats: This area is inhabited by Tripura, Jamatia community. They practise Jhum cultivation in accordance with settled crop in the bank of the river. Fishery and collection of forests resources are the basic livelihood options for the surrounding people. Hunting occurrence is also sporadically occurring by local tribe. Excessive tourist visit and boating activities resulted heavy disturbances for the wildlife. However, forest collection of forest products and intensive netting for fishes effecting entire biodiversity of the site.

Overall conclusion and recommendations:

1. The Baramura waterfall can be developed as potential heritage site. This study confirmed a wide range of services provided by the area. Local people showed their interest towards the development and conservation of the area. We encounter 15 water channels, shows that it could be a good perennial source of water for this distant place, which may indirectly help to conserve several stream faunal diversity.
2. The Bat cave of silachari is only the cave was seen in the state. Tourist from the whole Tripura used to visit the place but mainly from south Tripura people are frequent visitors. Recently one tour team from Bangladesh visited to the cave. At the time of "Birjumela", the number of tourist suddenly increases. At the entry point of the way to cave five shops are solely dependent upon the tourist visit for their business. As stated in the report, this is only the unique habitat of some threatened bats of this region. Besides that, this area has immense potential for conserving other rare plants and wildlife of the state. Hence, this site may declare as potential Biodiversity Heritage site for Tripura.
3. Earlier, Unakoti is known for its Archaeological important. But it has the enough potentiality to support local biodiversity and several ecosystem services. The surrounding forests supports divers floral and faunal elements. This place is a holy site for local community and showing rich traditional elements closely related with the ethno-religious-conservation aspects. Thus, many sacred big trees and floral elements are enjoining conservation just only for their religious faiths. Those stone are also very important from the geological point of view. Proper scientific study need to carry especially on these stones they may disclose several new historical and geo-morphological traits.
4. The vegetation of the Jampui Hills is very unique in nature. Several floristic elements have its restricted distribution in only within this area and about 50% of the flora could not found in rest other forest areas of the state. Several agro-ecosystem models are very unique and sustaining local biodiversity by providing ecosystem services and preserving local germplasm. This area is also suitable for several redlisted flora and

fauna. Protection and management of this area as Biodiversity Heritage Site (BHS) could help to preserve unique floral and faunal diversity and in addition to promote community based biodiversity conservation through on-going diverse agro-ecosystem models of Betlingshib and surrounding areas of Jampui Hill.

5. Debbari or Chabimura is not only important for its unique archaeological value. It is only the large belt of riverine forests and the banks of it have enough potential for sustainable agriculture. Thus it is also helping to conserve local crops diversity in a very productive land. The fish genetic diversity is very significant for conservation point of view. Many of them have already redlisted and need immediate conservation strategies. Indiscriminate fishing may need to control to protect this rich fish genetic diversity. However, several floral elements are also needs to preserve as they are very rare in the state. Frequent visits by the tourist are reducing wilderness of the site. The sculptures on the valley are eroding, if proper conservation measures are not taken immediately then we will lose those rich sculpture within 5-10 years. As the forests on the top of the valley has all ready removed by local inhabitants and thus in absence of forests, banks of the river are slowly eroding.