

***Report of Dr A Rahmani, member of the team for site inspection of the proposed DEMWE Lower Hydroelectric project in Arunachal Pradesh***

**Proposal for construction of 1,750 MW Demwe Lower Hydro Electric Project In Lohit District, Arunachal Pradesh**

During the 23rd meeting of the Standing Committee of National Wildlife Board held on 14 October 2011, the proposal for construction of 1,750 MW Damwe Lower Hydro Electric Project in Lohit District, Arunachal Pradesh, was discussed. Many members expressed concern about the downstream impact of the project, particularly the impact of daily water fluctuation in the Lohit River after the operationalisation of the dam. To get a picture of the possible impact on the fauna and flora, particularly globally threatened species such as the Bengal Florican, the MoEF constituted a team of Dr Asad Rahmani, Director, BNHS and Mr Pratap Singh\*, CCF (Wildlife), Arunachal Pradesh Forest Department “on the feasibility of the proposal.”

\*(Note: Mr. Pratap Singh decided to give his own report to the Standing Committee)

**Tour:** The 2-member team conducted the survey from 26-29 November and held discussion with a large number of officials. The following was the tour programme:

25 Nov.: Arrival in Dibrugarh, and Dibrugarh to Namsai (Arunachal Pradesh). Meeting with CF and DFO, Lohit Division.

26 Nov.: Namsai to Demwe Lower site (Parshuram Khund), meeting with Demwe Lower officials, site visit and detailed discussion with them. Moved to Tezu.

27 Nov: Tezu to downstream in two boats to inspect *chapories* (river islands) on Lohit River. Moved from Tezu to Tinsukia.

28 Nov.: Tinsukia to Dibru-Saikhowa National Park with Demwe Lower officials and DFO and in-charge, Dibru-Saikhowa NP. Moved to Dibrugarh. Meeting with District Collector, Dibrugarh.

29 Nov: Dibrugarh to North Lakhimpur: Meeting with DC of North Lakhimpur

**Discussion with officials**

Discussion with officials: We had detailed discussion with the following officials:

Mr. Yogesh, Chief Conservator of Forests, Eastern Circle, Tezu

Mr. Vaibhav Mathur, DFO, Tinsukia and in-charge of Dibru Saikhowa NP

Mr. T. Pertin, DFO, Lohit District

Mr. P. Sivakumar, DFO, Digboi

Mr. K.K. Dwivedi, District Collector, Dibrugarh

Dr. Anwaruddin Choudhury, District Collector, North Lakhimpur

Mr. Gagan Agarwal, Sr. Vice President, Athena Damwe Power Limited

Mr. Syed Javed Mohsin, Sr. Vice President (New Projects), Energy Infratech Pvt. Ltd.

Mr. Jayachandra Khandelwal, AGM (Energy), Energy Infratech Pvt. Ltd.

Mr. Yogesh Shete, EIPL's Environment Department

We studied the following reports provided to us the MoEF and Demwe Lower Project officials:

***Study on the impact of Demwe Lower (1750 MW) HEP on Dolphins and Avian Fauna of Lohit River in Downstream***, by M.K. Palit, Conservator of Forests, State Forest Department; Dr Awadesh Kumar, Assit. Professor, North-Eastern Regional Institute of Sciences and Technology, Itanagar; and Dr P. Nath, Director, State Fisheries Department, Itanagar

***Management Plan of Kamlang Wildlife Sanctuary (2007-08 to 2011-12)***, By C.K. Namsom, DCF, Kamlang Wildlife Sanctuary, Miao

***Response to the Information/Clarification sought by the Hon'ble Expert Appraisal Committee of River Valley and Hydro-electric Projects***, October, 2009. By Athena Demwe Power Private Limited, New Delhi.

***Environmental Impact Assessment and Management Plan for 1750 MW Demwe Lower HE Project, Arunachal Pradesh: Executive Summary***. September 2009. Prepared by Centre for Inter-Disciplinary Studies of Mountain & Hill Environment University of Delhi, Delhi.

***Effect of peaking Power Generation by Siang Lower HEP, Demwe Lower HEP, and Dibang Multipurpose HEP on Dibru-Saikhowa National Park, November 2011***. WAPCOS Limited, Gurgaon, Haryana.

Besides these reports, we also went through various petitions and letters that were sent by concerned persons to MoEF and other agencies or to us.

**Issues and Concerns:** After visiting the site, discussion with people, forest officials, district administration, and reading the reports provided by the MoEF, and going through various petitions given by local people/experts to the MoEF, we have come to conclusion that the following are the major wildlife issues and concerns that need to be addressed before any decision on the Demwe Lower project is taken up. A few non-wildlife issues which came up

during discussions or through submissions/petitions are also highlighted. However, our conclusions and recommendations are limited primarily to issues of wildlife and biodiversity concerns.

- 1) Dibru-Saikhowa National Park and Biosphere Reserve
- 2) *Chapories* of Lohit River as Important Bird Area
- 3) Impact on grassland ecology and grassland-dependent species such as Critically Endangered Bengal Florican
- 4) Impact on Gangetic Dolphin
- 5) Daily fluctuation of water and its adverse impact
- 6) Asiatic wild buffalo
- 7) Siting of project (Kamlang sanctuary, Parasuram Kund and MPCA etc.)
- 8) Strategic importance and first-user rights issue
- 9) Development of Arunachal Pradesh (as well as Lohit river basin in particular)
- 10) Likely impact on local communities in Arunachal Pradesh and Assam
- 11) Cumulative impact of proposed hydro-electric dams on Lohit, Dibang and Siang rivers
- 12) FAC referral to NBWL Standing Committee

## **Dibru-Saikhowa National Park and Biosphere Reserve in Assam**

Dibru-Saikhowa National Park, Poba Reserve Forest, Kobo *chaponi* (river islands) proposed reserve forest, Amarpur *chaponi*, Maguri and Motapung *beel* (lake), and the adjacent riverine tract of the Brahmaputra and Lohit rivers form one of the major biodiversity areas of Assam. This complex has been identified as an Important Bird Area by BNHS and BirdLife International in 2004.

Dibru-Saikhowa has the largest salix swamp forest in north-eastern India. Tropical Moist Deciduous, Tropical Semi-evergreen, Evergreen Forests and grassland forms the main habitat type. (Choudhury 1998). The Dibru-Saikhowa NP proper covers 34,000 ha in the districts of Tinsukia and Dibrugarh in eastern Assam. It is 13 km north of Tinsukia town. A larger area of 765 sq. km. is also a Biosphere Reserve. The area is known as a major haunt of the globally threatened White-winged Duck *Cairina scutulata*, Black-breasted Parrotbill *Paradoxornis flavirostris* and Marsh Babbler *Pellorneum palustre*.

The relatively remote Amarpur area, on the northern side of the Brahmaputra river, not included in the Sanctuary but is a part of the wider Dibru-Saikhowa Biosphere Reserve, has significant areas of tall grass, which are largely absent in the other areas of the Sanctuary. The Amarpur peninsula within the Biosphere Reserve covers about 3,000 ha. It is generally low-lying and much of it is flooded during the monsoon season (Allen 2002). This grassland has some of the most threatened avifauna of the Brahmaputra Valley.

### **Globally Threatened Bird Species in Dibru-Saikhowa**

Dibru-Saikhowa complex is very rich in bird life, with more than 310 species already identified (Choudhury 1994, 1997). Out of the 15 Critically Endangered bird species of India, the following five are found in Dibru-Saikhowa: White-bellied Heron *Ardea insignis*, Oriental White-backed Vulture *Gyps bengalensis*, Slender-billed Vulture *Gyps tenuirostris*, Red-headed Vulture *Sarcogyps calvus*, and Bengal Florican *Houbaropsis bengalensis*. Among globally Endangered species, we have White-winged Duck *Cairina scutulata* and Nordmann's Greenshank *Tringa guttifer*. Earlier, Masked Finfoot *Heliopais personata* was also reported from Dibru-Saikhowa.

The tall wet grasslands of Dibru-Saikhowa are important for many threatened and non-threatened species. Swamp Francolin *Francolinus gularis*, Black-breasted Parrotbill *Paradoxornis flavirostris*, Jerdon's Babbler *Chrysomma altirostre*, Long-tailed Prinia *Prinia burnesii* and Marsh Babbler *Pellorneum palustre* are found in the grasslands. In the wetlands and beels, the following birds are seen; Spot-billed Pelican *Pelecanus philippensis*, Greater Adjutant *Leptoptilos dubius*, Lesser Adjutant *Leptoptilos javanicus*, Baer's Pochard *Aythya baeri*, Pallas's Fish-eagle *Haliaeetus leucoryphus*, Black-necked Stork *Ephippiorhynchus asiaticus*, Oriental Darter *Anhinga melanogaster* and Greater Spotted Eagle *Aquila clanga*.

It is also an important wintering site of Black Stork *Ciconia nigra*. According to recent surveys, it has a total of 13 Vulnerable bird species.

### **Other key fauna**

Other fauna includes Asian Elephant *Elephas maximus*, Tiger *Panthera tigris*, Leopard *P. pardus*, Sloth Bear *Melursus ursinus*, Slow Loris *Nycticebus coucang*, Pigtailed Macaque *Macaca nemestrina*, Rhesus Macaque *M. mulatta*, Assamese Macaque *M. assamensis*, Capped Langur *Trachypithecus pileatus*, Barking Deer *Muntiacus muntjak*, Hog Deer *Axis porcinus*, Flying Squirrel *Petaurista* sp., Gangetic River Dolphin *Plantanista gangetica*, Monitor Lizards *Varanus bengalensis*, *V. salvator*, various turtles including *Kachuga sylhetensis*, snakes including Cobra *Naja naja*, and Python *Python molurus*. Assam Roof Turtle *Kachuga sylhetensis* was also recorded for the first time in the area, constituting the easternmost limit of its distribution (Choudhury 1994).

The Lohit river influences the eastern and southern part of the Dibru-Saikhowa area and given the richness of the habitat as described above, comprehensive and prior studies are required on

the impacts of flow fluctuations on the park. WAPCOS was given the consultancy to conduct this study last year and has submitted a modeling study recently to indicate flow fluctuations in the park. But we are very surprised during our interaction with the DFO, Vaibhav Mathur, that no field work has been done inside the NP in different seasons by the consultants (nor has permission been sought from the Chief Wildlife Warden, Assam, to do so) to study the habitat and wildlife behaviour at different times of the year to co-relate it with the flow changes for impact assessment. This is indeed a serious issue. It is unacceptable to conduct wildlife impact assessment only using computer modeling (which may be vital for understanding flow variations).

### **Chapories of Lohit River as Important Bird Area**

The chapories or river islands of Lohit River existing in Arunachal Pradesh and Assam are extremely important from biodiversity point of view. Considering their importance for grassland birds such as critically endangered Bengal Florican, White-bellied Heron, Red-headed Vulture, and endangered White-winged Wood Duck and many other species, these chapories were identified as Important Bird Area by BirdLife International and BNHS. This IBA includes the entire riverbed of the Lohit River, at places more than 10 km wide with sandy and grassy tracts. The area is the floodplains of the Lohit River and the entire area is criss-crossed by numerous channels turning it in to a complex of waterbodies, riverine islands, grassland and forests.

More than 140 species of birds have been listed during general wildlife surveys, and hence the total diversity could be more than 300 species, including large number of wintering waterfowl. There is extensive habitat for Jerdon's Babbler and Black-breasted Parrotbill – two globally Vulnerable species. As the area is remote and difficult to access, proper studies have not been conducted.

Among mammals, Tiger, Asian Elephant and Asiatic Wild Buffalo and Hog Deer have been reported. The Gangetic Dolphin is occasionally seen towards extreme west.

Even in the book *Important Bird Areas in India*, published in 2004, it was written (page. 226) “The proposed dams in the upper reaches would have serious impact in downstream ecosystem and the entire riverine tract will be affected.”

### **Impact on grassland ecology and grassland-dependent species such as critically endangered Bengal Florican**

The critically endangered Bengal Florican is perhaps the most famous bird of the grasslands of north-Indian terai and Brahmaputra river systems. Looking at its critical status (less than 300 survive in India), the MoEF has identified it as a species for which recovery plan has to be implemented. Only recently, a recovery plan workshop was held to develop Guidelines for Bengal Florican Species Recovery Plan.

The Bengal Florican is an extremely habitat specialist and indicator of good grassland. Once widely distributed in the grasslands of India, Nepal, Bangladesh, Cambodia and Vietnam, is presently found in Cambodia and restricted to few pockets of protected areas in India and Nepal. With its precarious conservation status, habitat specificity and indicator of threatened habitat like grassland, the Bengal Florican is an effective flagship species for wildlife conservation of grassland ecosystem.

The Bengal Florican needs a mosaic of grasslands, with short grass for display of male, tall grass for hiding and foraging, and taller grass for nesting and chick rearing. It breeds after winter and just before monsoon. The nest is made on the ground, hence it is susceptible to winter and summer flooding of grasslands. In order to maintain this mosaic of grassland habitat, natural or man-made controlled firing of dry grasslands, and/or wild ungulate grazing is necessary. As a management practice, the Forest Department set fire to grasslands (in Kaziranga, Orang, Dibru-Saikhowa etc) in January-February to control the grass biomass and also to allow new growth of grass that is good for wild ungulate. In order to burn the grass, it has to become dry. With daily fluctuation of water level in Lohit River due to Demwe Lower dam, it is likely that the grass will not dry sufficiently hence burning will be difficult, resulting in total habitat modification. At the same time, dense unburnt grass may become suitable for other birds and animals. However, looking at the precarious position of the Bengal Florican, and MoEF's commitment to protect it, we should not do anything to jeopardize its remaining limited habitat in Dibru Saikhowa and chapories of Lohit River.

The study by the AP government on the IBA (chapories of the Lohit river) has made a point that the bigger islands do not get submerged and has shown the elevation differences between average lean season flows (400 cumecs) and peaking non-monsoon flows (1729 cumecs) at a few cross-sections in the river.

But it is important to note that the IBA is not restricted to the bigger islands alone, but covers the entire tracts of the Lohit river as indicated earlier. There is nothing in the report about the impact of the different stages of the peaking operations and ensuing diurnal fluctuations between 35 – 1729 cumecs. The Committee comes to a conclusion that *“the transition zone between terrestrial and aquatic ecosystems of islands ... are located at elevation higher than the elevation corresponding to peaking release”*. It is not clear how any transition zone between terrestrial and aquatic ecosystems (e.g. habitat of shore or water edge communities of flora and fauna) can remain unaffected by water level changes in the river, whatever the peaking release is in any season.

It will be good if the developer/state government can provide data for elevation differences for the full diurnal fluctuation (35 – 1729 cumecs). Since a new minimum flow of 70 cumecs is being discussed (not finalised), the elevation differences for 70 – 1729 cumecs could also be provided in addition to above.

It would also be useful if elevation differences (for above variations) are provided at cross-sections at other points where large islands are not located (e.g. between Parasuram Kund and Cross-section A, two cross-sections between C and D in the relatively narrow cross-sections of the river).

## **Impact on Gangetic River Dolphin**

The impact on the Gangetic River Dolphin, the national aquatic animal, due to the 1750 MW Demwe Lower project is a major area of concern in the downstream areas in Arunachal Pradesh and Assam. During the site visit, the park warden of Dibru-Saikhowa NP and Biosphere Reserve, Vaibhav Mathur, raised serious concern about the likely impact on the dolphin due to altered flow regime in the Lohit river due to the 1750 MW Demwe Lower project.

The impact on the downstream dolphin populations was not studied at the time of grant of environmental clearance to the project. It is however part of the ToR prescribed in May 2010 for post-environmental clearance downstream environmental and social impact assessment study being done currently by WAPCOS. However, despite our asking for the report, draft/final report was not made available.

The National Environmental Appellate Authority (NEAA) examining an Appeal challenging the environmental clearance to the 1750 MW Demwe Lower project had passed an interim order dated May 3, 2010 asking the NBWL Standing Committee to examine the downstream impacts on IBAs and River Dolphins. As a response to this order the Arunachal Pradesh state Government conducted its own study restricted to the Arunachal Pradesh portion of the Lohit River. The Dolphin report of the AP Committee has primarily focused on establishing that Dolphins do not exist in the Arunachal portion of the Lohit River. The investigators referred to Wakid & Braulik (2009) in the report, where Wakid & Braulik (2009) recorded the maximum upstream distribution of Dolphins till Tenganimukh in Assam. However, Wakid and Braulik conducted the survey in February 2008 during the winter season of the year. Therefore, recording of Dolphin distribution up to Tenganimukh in February 2008 by Wakid & Braulik (2009) does not reflect on occurrence of the species upto this location in the other seasons of the year. Dolphins in Brahmaputra normally move through most of the major tributaries and forerunners of Brahmaputra during pre-monsoon, monsoon and post-monsoon season.

As per the description in the AP report, the investigators conducted the field assessment for dolphin occurrence in the 3rd week of February 2011 This indicates that the field assessment was conducted for a very brief period of time and that also for only one (winter) season of the year, whereas it should be a detail study covering all the 4 (pre-monsoon, monsoon, post-monsoon and winter) seasons of the year. There are no details about the survey methods and analytical methods used in the report, therefore it is unclear as to how the conclusions on dolphin

occurrence and related issues was arrived at. Even if the project operates at MDDL in the monsoons, the impacts on nutrients and other aquatic life due to the dam is also likely to impact the distribution and migration of dolphins in the Lohit and therefore this needs a comprehensive all season study at the very least.

A submission has been received from Dr. S.P. Biswas, Professor and Head, Department of Life Sciences, Dibrugarh University on the issue of impact of Demwe Lower on the Gangetic River Dolphin in the part of the Lohit in Assam, from the Assam-Arunachal border to Dibru-Saikhowa National Park and Biosphere Reserve. There is a resident population of dolphins in Dibru-Saikhowa and these are seen at seven locations in the Park. Most importantly, out of these seven locations four are on the southern boundary which is influenced by the flow of the Lohit River.

Prof. Biswas has raised serious concern about the likely diurnal fluctuations in the project, particularly the gross inadequacy of the minimum flow (35 – 70 cumecs) to be released from the project in lean season for the survival of the dolphin. An important point in this respect is that we cannot assume the full 90 cumecs from the lower Lohit catchment to supplement minimum flow from Demwe Lower in the lean season as dams are also planned on the major tributaries of the Lohit which meet the river in the downstream (e.g. Noa-Dihing). The joint Expert Committee of Gauhati University, IIT Guwahati, Dibrugarh University which studied the downstream impact of the under-construction 2000 MW Lower Subansiri project found that the minimum requirement for lean season flow in the Subansiri to maintain the ecology and depth of water for the dolphin would require at least one turbine releasing 320 cumecs as minimum flow at all times. The specific recommendation in their July 2010 report was:

“ 5. The minimum discharge of the natural river be maintained through the turbines by at least one unit running continuously for 24 hours a day with a discharge of 320 cumec. The minimum flow during the lean period is considered as the lower boundary of the environmental flow in the present study which will help in maintaining river ecology and groundwater recharging. To cope with the rapidly changing pore pressure developed due to fluctuation, it is recommended to open and close the units in sequential order and not at a time...”

In the Lohit case, comprehensive downstream studies will need to decide if the dam should be taken up and if yes, on what terms and conditions. According to Dr. Biswas at least 350 – 400 cumecs of water (average lean season flow) may need to be maintained as minimum flow even if the project passes other tests, keeping in mind the needs of the dolphin.

The NBWL Standing Committee should ask Dr. Abdul Wakid, member IUCN Cetacean Specialist Group and Dr. S.P. Biswas, Dibrugarh University to comment on the dolphin portions of the detailed post-environmental clearance downstream study till Dibrugarh (Assam) once completed. Under no circumstances should a decision regarding clearance to Demwe Lower be taken before their inputs are received on the detailed downstream impact study about to be completed soon.

## **Daily fluctuation of water and its adverse impact**

One of the major issues which has emerged in the discussions on the Demwe Lower project is the drastic fluctuations of flow in the downstream in lean season between 35 cumecs (during non-generation hours) and 1729 cumecs during peak hour generation. The cyclic variation between very low flows and very high flows in winter is likely to have major ecological impacts in the floodplains.

The submission made by wildlife biologist, Firoz Ahmed, gives a reference of a paper by leading freshwater ecologist, N. LeRoy Poff: *“The extreme daily variation below peaking power hydroelectric dams have no natural analogue in freshwater systems and represent, in an evolutionary sense, an extremely harsh environment of frequent, unpredictable flow disturbance. Many aquatic populations living in these environments suffer high mortality from physiological stress, from wash-out during high flows, and from stranding during rapid dewatering. Especially in shallow shoreline habitats, frequent atmospheric exposure for even brief periods can result in massive mortality of bottom dwelling organisms and subsequent severe reductions in biological productivity”* (Poff *et al.* 1997).

The WAPCOS report on impact of peaking (November 2011), however, has argued that variations of flow are normal and that the Lohit also experiences high flows in winter. But the data provided needs to be carefully analysed to see the actual reality and frequency of occurrence of the high flows.

Daily flow data for 19 years and 1685 days for the period from December to February, which is the lean season, has been analysed. It should be noted that for 1355 days the flow is in the bracket between 300 – 700 cumecs. i.e. over 80% of the days in the lean season for 19 years data, the flow is between 300 – 700 cumecs. Only 35 days out of 1685 has the flow exceeded 1000 cumecs. i.e. 2.08 per cent of the days. Therefore, on an average between 1-2 days (maximum two days) out of the 90-91 days every year from December – February the flow exceeds 1000 cumecs in the Lohit river.

After the Demwe Lower project is commissioned, it will be 1729 cumecs every single day for the 90-91 day period. Therefore, if flows of this magnitude move from 2 per cent of the days to 100 % of the days in winter, it is clearly a situation of ‘flood’ as far as winter ecology is concerned. Similarly, out of the 1685 days analysed, none of the days the flow is below 200 cumecs. In fact the lowest flow experienced is 292.44 cumecs. The lowest flow is below 300 cumecs only on 2.67 % of the days. But the low flows will now be only 35 cumecs (or 70 cumecs if revised) for 18 - 21 hr every single day for the entire 100 per cent of the days in lean season from December to February after commissioning of Lower Demwe.

Therefore, the flow in winter will fluctuate between a high flow which the ecosystem never experiences for 98% of the days in winter (1729 cumecs) and a low flow which the ecosystem

never experiences for 97% of the days in winter (35 - 70 cumecs) cyclically on a daily basis. Thus it is ecologically a matter of serious concern. Provision of monthly data for the period December – February, as well as hourly data may help understand the situation even better.

The addition of 90 cumecs from downstream tributaries of Lohit (average winter flows) to the minimum flow in the Lohit is also misleading as dams are also proposed on major tributaries which meet the river in the downstream (e.g. Noa-Dihing). Note that this is a shallow habitat in the plains. Therefore, even relatively smaller variation in water levels results in a large variation in the spread of water area.

The conclusion of the WAPCOS report (November 2011) that “There is no adverse effect of non-monsoon peaking operation on Dibru-Saikhowa Park due to the fact that the submergence level at all times remains below the lowest elevation of the park” is not factual. The impact of the flow fluctuation on shoreline habitat and wildlife, as well as on species such as the Gangetic River Dolphin is yet to be assessed. Moreover, the diurnal variation will also increase erosion in the park from what normally occurs in the natural state.

The conclusion that “As compared to the virgin condition, Demwe Lower H.E. project’s non-monsoon peaking causes a maximum water level rise of 0.24 m at Dibru-Saikhowa Park” is misleading. The “maximum winter flow peak” assumed is a range of flow which occurs on very few days in winter. For example, the flow over 1000 cumecs occurs only on 2.08 per cent days as per this report and only in December, but the non-monsoon peaking of 1729 cumecs will occur everyday. There is, therefore, a huge ecological difference here.

It has been stated that maximum water variation at Dibru-Saikhowa NP is 0.78 metres. Since the water will vary between 0.78 m (2-3 feet) at the park everyday in winter, clearance under 35 (6) of WLPA is necessary from Chief Wildlife Warden, Assam.

The Expert Committee of Gauhati University, IIT Guwahati and Dibrugarh University which studied the downstream impacts of the 2000 MW Lower Subansiri project has observed the following about diurnal fluctuations due to peaking in its July 2010 report that:

“ *Observations*

....5. *Flow regulation*

*It is observed from the study that there will be an abrupt diurnal fluctuation of flow discharge from 6 cumec to 2560 cumec, especially in the winter season. Minimum discharge, will, however, be high during summer season with subsequent enhancement of maximum discharge. The minimum discharge (6 cumec for about 18 hours in a day) during winter will definitely affect the river ecosystem as well as the ecology of the connecting wetlands. Aquatic fauna and flora, and dolphin population of the Subansiri will be destroyed by the project with its existing design and operational parameters. On the other hand the ground water table will be lowered substantially*

*due to inadequate water in the river for groundwater recharge, since groundwater recharging is related to infiltration rate to which time is an important factor. The fluctuation of discharge during the day with running all the eight units in the evening peak hour generation time will lead to rapid fluctuation of pore pressure in the river bank leading to bank failure and bank erosion.”*

Therefore, the impacts of diurnal fluctuations in Demwe Lower is certainly an issue which needs very detailed greater scrutiny. The existing studies do not deal with the impact adequately and come to generalised conclusions. The detailed downstream impact assessment (post-environmental clearance condition) is pending completion and will need to be examined once completed.

### **The Asiatic Wild Buffalo *Bubalus arnee***

A good population of the Asiatic Wild Buffalo is present in Dibru-Saikhowa (just over 400) and the riverine tracts and islands of the Lohit in Arunachal Pradesh also supports a population, but exact distribution and numbers are not known. One of the concerns regarding the downstream impacts of this project is the impact on foraging grounds of species such as the Asiatic Wild Buffalo and the Hog Deer due to diurnal fluctuations in winter, particularly the likelihood of consistently high flows in winter. As per the flow data provided by WAPCOS, the flows are more than 1000 cumecs only on 2.08 per cent days in winter as per data analysed over 19 years for the period December to January. After the commissioning of the project, the flow will rise as high as 1729 cumecs for every day in winter for a few hours (100 per cent of the days). This has a high possibility of impacting foraging grounds of species such as the Wild Buffalo and needs to be investigated in the downstream till Dibru-Saikhowa Biosphere Reserve at least. The ToR for the yet incomplete downstream impact assessment has a section on predicting impacts on the foraging ground of wildlife. However, the level of expertise of WAPCOS in studying wildlife related issues is a matter of concern based on earlier experience of the NBWL Standing Committee (e.g. EIA report for the 2000 MW Lower Subansiri). However, after examining their downstream study, a decision will need to be taken whether the information is of adequate quality to enable a decision to grant or reject wildlife clearance to the 1750 MW Demwe Lower project or whether we need more information.

The submission from wildlife biologist Firoz Ahmed also refers to an interesting case study by Dr. Asha Rajvanshi of the Wildlife Institute of India (WII) on the downstream impacts on Wild Buffalo foraging grounds due to a peaking hydropower plant in the upstream areas of the Indravati River. This is part of the study titled ‘*Assessed impacts of the proposed Bodhghat Hydroelectric project*’ is available at: <http://www.unep.ch/etu/publications/38%29%20281%20to%20293.pdf>

As per this case study:

*"Bodhghat Hydroelectric project is expected to cater to the peaking power requirements in the evening. All the four turbines will operate together during the evening hours resulting in heavy discharges that would be many times the rate of normal lean summer discharge. This sudden increase in water discharge would result in the flooding of the grassland habitats within Bhairamgarh Wildlife Sanctuary located 60 km downstream of the project location. Based on daily schedules of the turbine operations and discharges into the river, it is anticipated that the grasslands in Bhairamgarh Sanctuary would be flooded between 8 pm and 11 pm. This would coincide with the main foraging time of wild buffalo in summer, when such river bed grasslands are their critical food resource. The changed water discharge regime due to the project will thus severely jeopardize wild buffalo habitat in Bhairamgarh Sanctuary. This is particularly so because, out of the total areas of the Sanctuary the prime wild buffalo habitat is only about a fourth of this area falling in compartment numbers 80 to 85 and 87 to 89 (Figure 2)."*

Although the specific ecological context of the Lohit river basin is very different and there will be differences in project design and other factors, there is a parallel to be drawn here. Just as the downstream grasslands would have got flooded by the Bodhghat project in summer (lean season in Central India) during hydro-peaking, the downstream grasslands in the Lohit river basin (Arunachal and Assam) are likely to get flooded in the winter (lean season in Northeast India) during hydro-peaking. In both cases critical foraging areas of species like the Wild Buffalo will be impacted. A perusal of existing impact assessment documents done for the project show that such impact have not been studied at all.

### **Site of project vis-a-vis Kamlang Sanctuary, Parasuram Kund**

Various petitions have been received raising concern about the location of the Demwe Lower project impacting natural and cultural heritage sites.

It is a fact that bifurcating the original Demwe proposal into Lower Demwe and Upper Demwe has avoided submergence inside the legal boundaries of the sanctuary. However, some serious concerns about the project site remains. For example, the submission made by Bimal Gogoi of Upper Assam to Chairperson has highlighted that in June 2009 the project was assessed for Scoping clearance for increase of installed capacity from 1630 MW to 1750 MW by increasing the Full Reservoir Level (FRL) from 420 metres to 424.8 metres. As the submission highlights, prior to this meeting the developer wrote a letter dated 28<sup>th</sup> May 2009 (ADPPL/MoEF/090528) which was sent to the Additional Director in the MoEF handling river valley projects. The letter in point 5 states: *"..Now, after the necessary studies as desired by CEA, we found that the FRL could be raised as close to the border of Kamlang Wildlife Sanctuary due to the enhanced Spillway capacity."*

The EAC/MOEF agreed to this explanation and allowed the submergence to almost touch the border of the sanctuary (only 50 m away). It appears to be a violation of the precautionary principle that while keeping the submergence out of legal boundaries, an approach was adopted to bring the submergence as close to the boundary as possible, despite the understanding that

areas in a 10-km radius around PAs have to be considered ecologically-sensitive and that submergence of contiguous habitat immediately bordering Kamlang Sanctuary was involved.

The project is also in extreme proximity of a cultural heritage site, Parasuram Kund, and will submerge parts of an area identified as the Parshuram Kund Medicinal Plant Conservation Area (MPCA) for in situ conservation of Globally Significant Medicinal Plants (GSMP) as part of a MoEF project. This appears to be one of only seven such compact areas in Arunachal Pradesh and such appears to be significant from a conservation perspective. This information has not been provided to us by MoEF and as per the submission we have received the site is located between the following two latitudes and two longitudes respectively, on both banks of the Lohit river near Parasuram kund, within 1-2 km upstream of dam axis.

Latitudes: 27 degrees 53 minutes 22 seconds North and 27 degrees 53 minutes 47 seconds North.

Longitude: 96 degrees 22 minutes 27 seconds East and 96 degrees 22 minutes 91 seconds East.

The elevation of the MPCA is between 400 – 700 MSL and the area is 1600 hectares. Since the FRL of the Demwe Lower project is EL 424.8 m, portions of the identified MPCA will actually get submerged and the remaining will come in the direct disturbance zone during construction of this mega project which is between 1-2 km away. The MoEF/ Arunachal Pradesh state government is requested to confirm these details.

An examination of the Lohit river basin study also shows that even after dropping of the Hutong – I project, out of 144.2 km from the Indo-China border to where the river enters the plains, only about 49.9 km will flow free. Out of this 32 km is only from the border to the first project Kalai – I. Therefore, in the 112.2 km from Kalai – I to Parasuram Kund, only 17.9 km will flow free. This is a serious fragmentation of the aquatic habitat in the Lohit River and breakage of longitudinal connectivity of the river. In the current situation no migration of fish such as the Golden Mahseer would be able to take place in the uplands as Lower Demwe is located just before river enters the plains. The Lower Demwe project also has the longest submergence of 23 km long.

There appears to be a reasonable case to drop the Lower Demwe project in such a scenario. This will allow: longitudinal connectivity of the river between the uplands and the plains (the foothills are an important transition zone from an ecological perspective), migration of fish such as the Golden Mahseer can take place till at least 25 km upstream including some of the tributaries; avoid submergence of the Parshuram Kund Medicinal Plant Conservation Area and maintain the serenity and sanctity of the cultural heritage site; avoid submergence of habitat immediately contiguous with the Kamlang Wildlife Sanctuary.

**Strategic Importance and First User Rights issue:**

It was argued both during the October meeting, as well as the field visit that India needs to build this project as soon as possible for strategic reasons since Lohit is an international river and we need to establish our 'first user rights'. This issue does not seem to have come up during environmental clearance and pending forest clearance discussions in the respective decision-making bodies and in fact the environmental clearance letter dated February 12, 2010 states:

“Part A – Specific Conditions (xix) The environment clearance does not necessarily imply that forestry and wildlife clearance shall be granted to the project and that the proposals for the forestry and wildlife clearances shall be considered by respective authorities on their merit. The investment made in the project, if any, based on environmental clearance so granted, shall be entirely at the cost and risk of the project proponent.”

Therefore, the issue seems to have been brought up only during wildlife clearance to build a case for wildlife clearance of project using non-wildlife reasons. Without going into the merits and legal tenability of the 'first user rights' argument (which would be beyond the scope of the NBWL Standing Committee per se), it needs to be kept in mind that at least seven projects are planned on the main stem of the Lohit river and MoAs have already been signed for six of them: 1450 MW Kalai – I, 1200 MW Kalai – II, 1250 MW Hutong – II, 280 MW Anjaw, 1050 MW Demwe Upper and 1750 MW Demwe Lower. All these six projects also have Scoping clearance from the MoEF under the EIA notification, 2006 . Any other project on the main stem of the Lohit River would also technically qualify to be developed to establish 'first user rights'. Therefore, it would be incorrect to argue that having a dam in the exact current location of the Demwe Lower Project is the only way we can establish 'first user rights'.

It needs to be also kept in mind that the project site which has been investigated first and for the longest period on the Lohit river is the current site of the Upper Demwe project. It was investigated by the Brahmaputra Board/CWC/GSI/ NEEPCO first as the 'Lohit' dam and then was called the 'Demwe' project. Therefore, till not too long ago this was being considered as the site for building the first project on the Lohit river (and a project is currently proposed at the site, Demwe Upper, by the same developers as Demwe Lower). Therefore, Demwe Lower needs to be assessed on its merit for wildlife clearance and not by employing arguments such as strategic interests etc.

Even if legally tenable, 'first user rights' needs to also be looked at beyond just the act of building hydropower dams. There are cultural and natural heritage sites through which the Lohit river flows in the downstream (e.g. Dibru- Saikhowa Biosphere Reserve declared under the Man and Biosphere Programme of the UNEP). People have also been exercising traditional rights in terms of fishing, navigation and agriculture in the river in the downstream.

### **Development of Arunachal Pradesh (as well as Lohit river basin in particular)**

While the country certainly needs power, the green clearances (environment, forest and wildlife clearances) are precisely in place to evaluate project based on their impacts and decide whether

to grant or reject clearances in specific cases. The development and power needs of Arunachal Pradesh has also been cited as a reason during discussions for giving permission the 1750 MW Demwe Lower project.

But an examination of facts submitted to the Standing Committee reveals that as of July 2011 Arunachal Pradesh government has signed agreements (MoAs) with power developers for 147 hydropower projects for over 40,000 MW of installed capacity (the figure has crossed 150 as of today, but exact figures were not available). MoEF has granted pre-construction clearances to around 50 projects until now in the state under the EIA notification 2006 and final environmental clearance to at least 12 hydropower projects until now under both EIA notification 1994 and EIA notification 2006 as follows: 405 MW Ranganadi Stage – I (commissioned), 600 MW Kameng (under construction), 2000 MW Lower Subansiri (under construction), 1000 MW Siyom, 110 MW Pare (under construction), 130 MW Gongri, 1750 MW Demwe Lower, 66 MW Khuitam, 96 MW Nafra, 700 MW Tata – II, 600 MW Tawang – I and 800 MW Tawang – II. Seven of these 12 projects have been given environmental clearance in 2010 – 11. Therefore, a large number of projects are underway in the state and it will be misleading to argue that the power and development needs of the state hinges on Lower Demwe in particular.

***Development of Lohit river basin:*** Similarly, the entire development of the Lohit river basin is also not hinged on this one hydroelectric project. Even if we ignore the urgent necessity for options assessment for ecologically and socially sensitive development policies and assume large hydropower as the appropriate development driver for the river basin as per chosen policy of state government, the facts are as follows. As per current information there are at least 13 hydropower projects proposed in the Lohit river basin and MoAs have been signed with developers for at least 11 of these already. Seven of these proposed projects are on main Lohit river itself: 1450 MW Kalai – I, 1200 MW Kalai – II, 588 MW Hutong – I, 1250 MW Hutong – II, 280 MW Anjaw, 1050 MW Demwe Upper and 1750 MW Demwe Lower. Six of the projects are on tributaries of the Lohit: 98 MW Tiding – I, 68 MW Tiding – II, 96 MW Raigam, 21 MW Kamlang, 99 MW Gimliang, 75 MW Noa-Dihing. Moreover, the developer of the 1750 MW Demwe Lower project has two more projects in the upstream of Lower Demwe (1050 MW Demwe Upper and 280 MW Anjaw).

Therefore, the Demwe Lower proposal needs to be examined by us solely on its merits as per our mandate.

### **Likely impact on local communities in Assam and Arunachal Pradesh**

We will not go into this issue in detail, but briefly highlight a few issues since a number of submissions to the Standing Committee have brought up this issue. Only those whose lands will be acquired by dam, powerhouse, submergence etc. seem to have been identified as project affected. Downstream impacts are only being studied as part of post- environmental clearance downstream impact assessment currently being carried out. The ToR for post-clearance

downstream impact assessment commissioned by MoEF includes the following on 'Impact Prediction':

*"Impact Prediction*

*The study would predict the impacts of Damwe Lower HEP on the following areas*

- *Dibru-Sumani i.e. flat lands near Arunachal-Assam Border.*
- *Reservoir operation on flow regime at various stretches especially with respect to riverine islands and tracts.*
- *Agriculture resources and cropping patterns.*
- *Beels, Chapories, Ramsar sites (if any), IBA sites (if any) etc*
- *Foraging grounds (if any) of wildlife*
- *Cattle camps and dairy business*
- *Fisheries and aquatic fauna*
- *Boulder, sand and drift wood collection"*

There appear to be several issues which could impact both ecology and livelihoods of local communities and it is surprising this a post-environmental clearance ToR and not done in advance. The Arunachal Pradesh government study in the riverine islands and tracts of the Lohit river in the downstream emphasizes that there is extensive human use of the area - agriculture, livestock rearing, grazing, fishing, navigation, both permanent and floating populations of people. This only confirms the need for detailed advance impact assessment to assess the social and livelihood impacts in the downstream due to the project. As discussed before, one of the major issues in the Demwe Lower project is the major diurnal fluctuations due to peaking operations. The downstream livelihoods and activities likely to be impacted by this unnatural daily flow fluctuation in the Lohit include: fishing, winter agriculture in riverine tracts, river transportation and livestock rearing in grasslands. But a clear idea on impacts can only be available once ongoing impact assessment study is completed.

### **Cumulative downstream impacts of proposed hydro-electric dams on Lohit, Dibang and Siang rivers**

A WAPCOS report (November 2011) on impacts of peaking operations of projects on the Siang, Dibang and Lohit rivers has recently been uploaded on the MoEF website and was also

forwarded to us before our field visit. The report involves flow estimation using computer simulated models and therefore cannot be verified fully by us. Some comments on flow data in this report have already been given earlier in the report.

A few additional observations about the origins of this report and some findings.

The Expert Appraisal Committee (EAC) on River Valley and Hydroelectric projects had in its August 2010 meeting while discussing the Lower Siang project observed that:

*"The impact of Lower Siang Dam on the altered hydrology of Brahmaputra river was discussed. It was consciously felt that Brahmaputra river is influenced by significant contribution from Lohit and Dibang rivers. The operational pattern of terminal dams on Lohit and Dibang may influence the flow in Brahmaputra, particularly in the downstream Dibrusaikhowa National park and Chapory. It is therefore decided that the three developers J.P., NHPC and Athena will coordinate to get the downstream impact study of Siang by a comprehensive examination of the three rivers Siang, Dibang and Lohit. The MoEF may issue necessary instruction in this regard."*

Thus this study became a part of the downstream impact assessment ToR granted as part of the Scoping process for the Lower Siang project. An earlier version of this study forms a part of the EIA report of the Lower Siang project currently uploaded on the website of the Arunachal Pradesh State Pollution Control Board (APSPCB) website. After the EAC meeting held on November 12, 2011, WAPCOS has modified this study and submitted a modified version on November 18, 2011 (present version on MoEF website). This requires more detailed scrutiny but a preliminary perusal indicates that there are substantial differences in the findings of the two reports (in terms of cumulative water volume and level fluctuations due to operation of three projects in downstream Dibru-Saikhowa). For example, the revised report shows less fluctuation in flows and level at Dibru-Saikhowa due to operation of three projects on Siang, Dibang and Lohit than the earlier version. Along with seeking a clarification from WAPCOS, this report also needs to be peer reviewed as modeling results can vary substantially due to their sensitivity to accuracy of parameters (e.g. boundary conditions, how different water streams and channels have been accounted for while taking the computational channel and other factors). Since the project will also require permission from the Assam government as per section 35 (6) of the Wildlife (Protection) Act, 1972 since flow fluctuations will take place inside Dibru-Saikhowa National Park, they could be asked to take the opinion of local experts (IIT Guwahati and the local universities) on the report.

An important point to remember is that the floodplains of all three rivers – Siang, Dibang and Lohit – are Important Bird Areas and potential Ramsar sites. The Siang floodplain has the D'Ering sanctuary. Therefore, comprehensive individual and cumulative impact assessment studies will have to be conducted as this entire Brahmaputra tri-junction landscape is very sensitive from a wildlife/ecological point of view.

## **FAC referral to NBWL Standing Committee**

A petition has been received from Shri Akhil Gogoi highlighting the fact that the FAC had referred his complaint to the Arunachal Pradesh state government and NBWL Standing Committee on forest violations and other related issues in the Demwe Lower case. His submission counters some of the claims made in the response of the Arunachal Pradesh state government to his complaint. But we have neither been forwarded the original complaint of Akhil Gogoi referred to NBWL Standing Committee as well as the response of Arunachal Pradesh state government to it by MoEF. In this scenario, it is not possible to make any observations on the same. The MoEF is requested to make the complaint of Akhil Gogoi and the response of the state government available to NBWL Standing Committee members before the next meeting.

## **CONCLUSION & RECOMMENDATIONS**

Based on site visit, perusal of the documents, discussions in the last meeting and submissions made by a number of individuals and organisations, including from the scientific community from Northeast India, here are our Conclusions and Recommendations:

### **CONCLUSION**

In the above sections, we have outlined in detail the various issues which came up while examining the issue. Broadly, it appears there are two main issues:

- a) Site of the project and issues associated with it.

These include: Submergence of habitat in close proximity of Kamlang sanctuary; impact on serenity and sanctity of cultural heritage site Parshuram Kund; submergence of portions of Parshuram Kund Medicinal Plant Conservation Area (MPCA); loss of longitudinal connectivity between the Lohit river in the uplands and the plains since Demwe Lower is located just before river enters the plains (impact on migration of golden mahseer, submergence of 23 km of river length).

- b) Downstream impacts of the project in Arunachal Pradesh and Assam

The biggest issue and a recurring theme in our enquiry and submissions received was the downstream impacts of dams as apparent from earlier parts of this report. The existing downstream impact assessment related reports were found to be either inadequate, misleading in their findings (examples in above sections) or incomplete (still ongoing detailed downstream impact assessment of project by WAPCOS). A decision on the downstream impacts of the project cannot be taken based on the existing documents.

The main issues which came up were: Impacts on important habitats such as Dibru-Saikhowa National Park and Biosphere Reserve and the *Chapories* of Lohit River; impact of major diurnal

fluctuations in the lean season between 35 cumecs and 1729 cumecs; impact on grassland ecology and grassland-dependent species such as Critically Endangered Bengal Florican; impact on other species such as the Gangetic Dolphin and the Asiatic Wild Buffalo; cumulative impact of proposed hydroelectric dams on Lohit, Dibang and Siang rivers and the confluence at Dibru-Saikhowa Biosphere Reserve.

## RECOMMENDATIONS

- 1) Based on the issues raised in the 'Site' section above, there appears to be enough merit for rejection of a mega hydropower project at the present site of the Demwe Lower project at Parshuram Kund to protect an ecologically sensitive stretch of the lower reaches of the Lohit river and its tributaries in close proximity of Kamlang sanctuary (the only Protected Area in Lohit and Anjaw districts). Dropping the project will also help maintain a degree of longitudinal connectivity between the plains and uplands, considering the fact that a cascade of seven large hydroelectric projects proposed on the main Lohit river will lead to a serious fragmentation of the river. This will also help protect the environment in and around the cultural heritage site, Parshuram Kund.
- 2) Downstream impact issues:
  - a) As indicated earlier, the presently available downstream impact assessment reports do not provide us adequate information to take a decision to grant or reject wildlife clearance to the project on the aspect of downstream impacts. But *prima facie* there are serious concerns about downstream impacts on wildlife habitat and species. In this scenario, the Precautionary Principle should be applied and under no circumstances should wildlife clearance be given based on current information/impact assessment reports.
  - b) An independent consortium of scientists/groups should be set up to peer review the existing reports on Demwe Lower, identify gaps for additional study, and conduct the necessary additional studies within the next 2-3 years. Authors of existing reports on Demwe Lower cited earlier should be given an opportunity to express their opinion/views during the review process. A suggested composition of the independent consortium could consist of Nature Conservation Foundation, Aaranyak, IIT Guwahati, BNHS and WII. MoEF should fund this initiative independently and not through the project developer.
  - c) A decision regarding wildlife clearance should be taken after the process outlined in above is completed. Under no circumstances should the above mentioned process stated in b) be carried out *post-facto*.
  - d) Since flow variations will take place at Dibru-Saikhowa National Park, permission should also be sought under section 35 (6) of the Wildlife (Protection) Act, 1972 from the Chief Wildlife Warden, Government of Assam.

Asad R. Rahmani

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