UTILITY OF FRESH WATER FLOODED FORESTS IN INDIA

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There are vast areas of fresh water flooded forests in Amazon River, Mekong River and Meghna River (Bangladesh) basins. In these flooded forests, the flora & fauna is richer than tropical ever green forests and many tree species grow more than 20 meters in height. These forests are inundated by flood water up to ten meters depth for 5 to 7 months duration at a stretch. The portion of forest under the water remains verdant similar to the portion above the water level.

Many trees with commercial value yielding fruits, seeds, timber, etc are native to flooded forests. In flooded forests, the fish growth is also very encouraging as they feed on tree seeds, fruits, vegetation, etc.

Amazon River basin:
Nearly 1,50,000 square km of total five million square km forest in this river basin is occupied by fresh water flooded forests along the river course. The average duration of flooding is seven months in a year up to ten meters water depth. The tree species of the flooded forests are often distinct from those found in the upland forest, or terra firma although species pairs (i.e. one adapted to upland and the one to flooded forest) are common. Flooded forest trees can survive without flooding, as planting them in upland soils demonstrates. But upland species cannot tolerate long periods of water immersion. Thus it seems that speciation evolved from flood plain to uplands.

Rubber tree (Hevea brasiliensis / Hevea spruceana) is a native species of fresh water flooded forests. Rubber tree thrives in the Amazon flooded areas and reaches two to three times taller than that of upland plantation trees.

Mekong river basin:
The seasonally inundated forest of Lake Tonlesap is legendary. Acting as part of the Mekong floodplain, the flood pulse from the Mekong River reverses the flow of the Tonlesap River to inundate the forest surrounding the Lake which expands in area from around 300,000 hectares to 1.2 million hectares at peak flood height (7 meters above the minimum level), inundating over 500,000 hectares of forest. As the water level of the Mekong River drops after the six months long monsoon flows, the Tonle Sap River resumes its normal direction of flow and discharges the lake into the Mekong Delta.

There are also flooded forests in flood plains of Thailand's Songkhram River which is a tributary of Mekong River.

Meghna river basin:
There is fresh water flooded forest in Bangladesh also. This fresh water lake is created by monsoon rains and is called "Hakaluki Haor" located in Sylhet district bordering India. The lake's water level rises by five meters for five months period during the rainy season. The lake occupies nearly 700 square km at its maximum level. Much of the thick flooded forest was destroyed during seventies by locals to convert in to paddy fields. Still the

flooded forest trees species sprout from the lake bed but constantly destroyed by grazing. Flooded forest restoration process is also taken up in few pockets of the lake.

Utility of fresh water flooded forests in India:
The climatic conditions in Amazon, Mekong & Meghna river basins are similar to many river basins of India. The flooded forest tree species can be grown in our water reservoirs to increase the forest cover and also to enhance productive output from the water bodies. Flooded forests can be grown in the rim of reservoirs (major & medium) up to 7 meters water depth. These reservoirs reach the dead storage levels after the cropping season and most of the reservoir areas remain dry for four to five months till the monsoon rains fill up the reservoirs.

There are nearly 30,000 square km of fresh water reservoirs used for irrigation, hydro electricity and drinking water purposes. The reservoir spread area up to 10 meters water depth is normally submerged for 6 to 7 months duration only and later becomes exposed during dry season when the water is used for irrigation, etc. Many reservoirs are yet to be built to harness the available river water fully. Whenever irrigation or hydro electric projects are proposed by building dams across the rivers, the major problem encountered is submergence of forest land. Water reservoirs and forest can exist symbiotically in the same area. The flooded forests can be grown in the rim of the reservoir area up to 10 meters water depth. The submerged forest area under new water reservoirs can be compensated by growing flooded forests in existing water reservoirs. Thus the land area can be used both for storing river water and growing flooded forests

Alternatively, Rubber trees (varieties native to flooded forests) can be grown in the water spread area of reservoirs up to ten meters depth. If rubber trees, etc are grown in the reservoir areas, it will make reservoir lands more productive and also mitigate global warming. There is no detrimental effect to the reservoir water quality due to flooded forest plantations.

If flooded forests are grown in the water reservoirs, the following multipurpose benefits are accrued.

1. The land area is used for storing the river water for agriculture, hydropower, etc.
2. Rich tropical ever green flooded forest trees mitigate green house gas effect.
3. The fish production from the reservoirs will increase by many folds due to enhanced food availability from the flooded forests.
4. The flooded forests contribute additionally to propagate the fauna of the area.
5. The tribal population can depend on forestry as usual and also on fisheries.
6. The water spread area can also be used for growing commercial plantation like rubber trees to create lively hood to the displaced population by land submergence.
7. The flooded forests will also become bird sanctuary for the migrating birds, etc as they are located on the water bodies.
8. Flooded forests will serve as attractive tourist destination contributing to the local economy.

It is not the humans who started dam building but the nature itself. Dam building (flooding an area) is a natural geological evolution taking place where the rainfall in a river basin is high and the downstream/estuary of the river is unable to discharge the flood water in to Sea due to sedimentation, etc. Nature has adapted to this phenomenon by evolving tree species suitable to survive in flooded conditions. In many ways, flooded forest's contribution in fresh water reservoirs is similar to combination of coral reefs & mangroves in the Sea by providing food, protective shelter and breeding place to sustain rich aquatic fauna. It is high time to take up detailed study and pilot projects to grow flooded forests in manmade water reservoirs. It will utilize the water bodies more productively and also to compensate the loss of forest land under new irrigation projects.

Some literature available in internet:
(If these links are not working directly, copy & paste the links in the internet browser.)

http://www.docstoc.com/docs/8278793/0393114B "Flooded forests of the Amazon"
http://airsar.jpl.nasa.gov/documents/workshop2002/papers/E7.pdf "Mapping wetlands and floods in the Tonlesap basin"
http://www.mangroveactionproject.org/files/map-asia/MethodforfloodedforestconservationatTonlesap.pdf "Method for flooded forest conservation at Tonlesap"
http://umanitoba.ca/outreach/begcb/pub/posters/Peloquinetal_issrm2008poster.pdf "Degradation and restoration of a flooded forest in Bangladesh"
http://www.hydro-soft.co.jp/image/report/iguchimk/iguchimk04.pdf "Numerical simulation of flood lake behavior in Northeastern Bangladesh"
http://priyo.com/news/20081123/16286 "Flooded forest Conservation efforts in Hakaluki Haor"
http://images.google.com/images?gbv=2&hl=en&sa=1&q=%22flooded+forest%22+varzea&btnG=Search+images&aq=f&oq=&aqi=&start=0 "Images of Varzea flooded forests of Amazon river basin."
http://images.google.com/images?gbv=2&hl=en&sa=1&q=%22flooded+forest%22+igapo&btnG=Search+images&aq=f&oq=&aqi=&start=0 "Images of Igapo flooded forests of Amazon river basin."
http://images.google.com/images?gbv=2&hl=en&sa=1&q=%22flooded+forest%22+%22tonle+sap%22&btnG=Search+images&aq=f&oq=&aqi=&start=0 "Images of Tonlesap flooded forests of Mekong river basin."
"Blue Print for Godavari River Water Utilization in Andhra Pradesh**"** Refer page 'N.Sasidhar' in http://groups.google.co.in/group/irrigation-power-energy?hl=en

(**Tips to get more information:** Search with relevant words/terminology in internet search engines & Google images for pictures on any topic.)