No River can have a drop of surplus.

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Is the world running out of water? Not really. The world water crisis has more to do with managing water resources badly than with a lack of resources. We need to understand the nature of water scarcity to take the appropriate action. Water poverty, or water insecurity, is the lack of access to safe and affordable water to satisfy a person's needs for drinking, washing or their livelihoods. When a large number of people in an area are water insecure for a significant period of time there is water scarcity. Water scarcity can be physical, economic or institutional. We also need to understand how much water we have. Discussions of water availability tend to include only the "renewable water resources" – that is only some 40% of the total rainfall worldwide. The other 60% is crucial for both food production and the environment.

Water is a critical element in sustainable development. It is a key ingredient in generating rural livelihoods, growing food, producing energy, encouraging industrial and service sector growth, and ensuring the integrity of ecosystems and the goods and services they provide. Water also poses its own development challenges—floods, droughts, and waterrelated diseases can have a huge impact on communities and indeed on national economies. So how can countries overcome these challenges and meet the water needs of people, industries, and ecosystems? There is a rising awareness of the need for an integrated water resources management, considering the river basin as the basic planning unit. This brings into focus the concept of involvement of all stakeholders at local, basin national and international levels. The building up of 'hydro-solidarity' implies a higher ethical involvement of citizens in their interaction with water, particularly during crises

The interlinking of Rivers Pamba and Achencovil flowing through Kerala with River Vaipar in Tamilnadu has aroused much controversy. At present the controversy is over the raising of water level in Mullaperiyar Dam. some years ago the controversy was over the pollution of River Pamba due to Sabrimala pilgrimage. As per the activists River Pamba is known as Southern Ganges, as per Hindu Mythology it has to get special attention. The struggles and cry of the eco activists of River Chaliyar and Periyar submerged when the demand of the eco-activists of river Pamba got an upper hand and the river Pamba got special attention of union Government. All these issues are getting momentum on the basis of political backing and not on any scientific basis. Is there any comprehensive scientific study on the rivers in Kerala. Some researchers studied some aspects of the rivers and its impact has not been assessed fully. Without a comprehensive study any work disturbing the flow of rivers will affect the ecological stability.

What affects nature, however, also affects human beings. The process of environmental degradation will lead to a socioeconomic crisis. An "environmental

catastrophe" and "hydrological poverty" that happened in the Aral Sea region could be predicted here also if a disturbance in the flow of water materializes. The idea of surplus water in a river itself is a wrong concept in an ecological context.

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Some hydrologists are treating flowing water as a commodity whose optimal exploitation is necessary . In this sense water has been a victim of commercially oriented science. Hence the notion arises, "Three-fourths of the total flow of our rivers is wastefully emptied into sea". (As per Water Atlas of CWRDM the total annual stream flow of Pamba is 3423.7Mm^3 . Water requirement is below 2000Mm^3. For Achencovil this is 1484Mm^3 and below 1000Mm^3 respectively). The ecological science treats waters of the earth, their occurrence, circulation, and distribution, their chemical properties, and their reaction with their environment, including their relationship with living things. Water is indisputably a part of a continuous system that circulates in its different forms on a periodic basis. During monsoon there may be floods in Kerala rivers which cannot be considered as a yardstick of surplus waters. A regular, annual flood is of particular advantage to the aquatic systems along large flood plain rivers. Many species of aquatic fauna has adapted to this annual flood pulse which connects the main river channel to flood plain waters and flood reserves. Large flood plain rivers derive most of their animal bio-mass from within the flood plain. Without flood pulse, production within the river ecosystem will be drastically reduced, and community composition and energy pathways are radically changed. On ecological point of view there is no surplus water in any rivers.

The flood ("Surplus") water is essential to keep the Eco-balance of the area where the river is flowing.Given the fact that Kerala has a unique topography that undergoes significant altitudinal variations within its maximum width of about 60 kilometres, the management of its meandering rivers emerging from the forested Western Ghats assumes a special significance. Since these rivers reach the sea quickly, they must perform significant ecological functions of sustaining flora and fauna along their course. Any discontinuation or reduction in their flow could be ecologically disturbing.

Persistent Organic Polutants (POP)

The organo chlorine pesticides used/ being using in highranges and other places at last reaches Kuttanadu and Vembanadu lakes. The half life of Organo chlorine pesticides are very high. (The half life of DDT in water is 150years). The high rate of flow and the annual floods are helping the rivers in pushing out the organo-chlorine pesticides (Persistent Organic Pollutants- POP's) into the sea/lake

Persistent organic pollutants (POPs) represent a serious threat to all living organisms on planet Earth. This group of chemicals includes pesticides as well as unintentionally produced POPs such as polychlorinated dioxins and furans (PCDD/Fs). They are stealthy killers though they do not cause immediate death. Dioxins, DDT or polychlorinated biphenyls (PCBs) cause hormonal defects even in very low quantities and they threaten reproduction of people and animals. (They have for instance a

negative impact on male fertility). They also harm the immune system and some of them cause cancer. Due to chemical stability they persist in the environment for a very long time and travel thousands kilometers from their source of origin. They are not soluble in water, but in lipids. This characteristic helps them bioaccumulate in the fatty tissue of animals.

Some POPs such as dioxin have been measured in small quantities in core ice samples from ancient times, but the current high levels of POPs in the environment indicates that modern industrial practices are responsible for the current concentrations of POPs in humans, animal populations and the environment. POPs have been used as industrial chemicals and as pesticides. Some POPs are also produced as by-products during industrial processes such as incineration or in other manufacturing processes where chlorine is used.

”Recognizing that persistent organic pollutants possess toxic properties, resist degradation, bioaccumulate and are transported, through air, water and migratory species, across international boundaries and deposited far from their place of release, where they accumulate in terrestrial and aquatic ecosystems,”

According to a report from the Kerala State Council for Science, Technology and Environment, the State's rivers are being increasingly polluted by industrial and domestic waste as well as pesticides and fertilizers. The State Environment Report, Kerala, 2005, cites the Periyar and Chaliyar as two cases of pollution of water bodies by industrial effluents.

Other rivers such as the Chalakudy, Periyar, Muvattupuzha, Meenachil, Pampa and the Achencoil are also far from healthy, mainly on account of bacteriological pollution. One important indication of this sorry state of affairs is the incidence of mass mortality of fishes. Such instances have been reported from the Periyar, Chitrapuzha, Chaliyar and the Kallada rivers and lakes such as Vembanad and Ashtamudi. Even radioactive wastes have been reported from these areas.

3)<u>The diversion of water from Achencovil and Pamba results in the reduction of the flow of water which may result in the reverse flow in Rivers Pamba and Achenkovil</u> .

The possibility can be predicted because of the following two reasons:

a) Because of rampant sand mining the river bed is going down. When the rate of the flow of water decreases the arrival of the quantity of sand will also decrease. Hence there is a possibility of the reverse flow up to Kozhencherry or up to Ranny.
b) The above prediction may be substantiated by quoting some data from the journals. During the twentieth century, sea level rose by 10-20centimeters (4-

8inches). As the CO_2 level is increasing, we know that the temperature of the earth is also increasing. The model used in the intergovernmental Panel on Climate Change 2001 Assessment projects that sea level could rise by as much as one meter during the twenty-first century. Thus if sea level rises by one meter, the coastline will retreat by 1500 meters. The water in many rivers may flow in the reverse direction. The POP's flowing back through the reverse flow of water will affect not only flora and fauna but also the health of the people living on the banks of the river.

The reduction in the rate flow of water will result in the elevation of MPN count of coliform bacteria.

In the case of River Pamba the rate of the flow of water is very important. The River Pamba is famous for Coliform bacteria. Out of the 44 rivers in Kerala , highest count of coliform bacteria has been reported in river Pamba. One of the methods to reduce the count of coliform bacteria is to maintain a high flow rate. The life span of coliform bacteria is low in water having high dissolved oxygen(DO) content. During summer we notice very high MPN count of coliform bacteria throughout river water. Hence diversion of water from upstream of Pamba will leave behind a water with elevated MPN count in the downstream. This will result in the total pollution of river.

5) Diversion of river water- lessons from history

a)Rivers Periyar, Bharathpuzha, Chalakudy

Storage or diversion of waters for irrigation from the rivers of Kerala has caused ecological damage reflected in the irreversible saline ingress along the state's coast. Periyar, the longest river of the state, with a length of 244-kilometres, has already lost 22 per cent of its average flow due to diversions. Likewise, the Bharathapuzha has had its flow reduced by 12 per cent on its 209-kilometre-long journey to the sea. By far, the biggest victim has been the 140-kilometre-long Chalakudy river, which has suffered a 37 per cent reduction in its natural flow

b)Aral Sea

The Aral Sea is actually not a sea at all. It is an immense lake, a body of fresh water. In the last 30 years, more than 60 percent of the lake has disappeared. Beginning in the 1960s, farmers and state offices in Uzbekistan, Kazakhstan, and Central Asian states opened significant diversions from the rivers, Syr Darya and Amu Darya, that supply water to the lake, thus siphoning off millions of gallons to irrigate cotton fields and rice paddies. In 1965, the Aral Sea received about 50 cubic kilometers of fresh water per year--a number that fell to zero by the early 1980s. Consequently, concentrations of salts and minerals began to rise in the shrinking body of water. That change in chemistry has led to staggering alterations in the lake's ecology, causing

precipitous drops in the Aral Sea's fish population. Following impacts are noted in the “Environmental Catastrophe” of Aral Sea.

Environmental/Economic : Degeneration of the delta ecosystems, Total collapse of the fishing industry , Decrease of productivity of agricultural fields. Climatic : Mesoclimatic changes (increase of continentality) Increase of salt and dust storms Shortening of the vegetation period. Health: The drying-up of the Sea, and the salt and dust laden air, have had a damaging effect on the health of the people, and the animal and plant life as well. The introduction of pesticides into the rice and cotton fields, and the seepage of the residues back into the rivers, has heavily contaminated the water for those communities living along the banks of the rivers flowing into the Sea. This has further aggravated people's health. Diseases like anemia, cancer and tuberculosis, and allergies are frequent. Many children are born with defects. Also in the years since the first project was implemented, there has been a continued increase in Typhoid fever, viral hepatitis, TB, and throat cancer in many areas as high as three times the national average. All of these complaints can be attributed either to the reduction in quality and quantity of water resulting from the drying up of the Aral Sea of the spread of toxic dusts and deterioration of the regional climate resulting from the Aral Sea disaster.

Kerala has been duped many times in the past over inter-basin water transfers by Tamil Nadu .

The Parambikulam Aliyar Project (PAP) treaty was signed between Kerala and Tamil Nadu only on 29 May 1970, in a ritual act of post facto validation. The construction of dams to transfer the waters had been commissioned much before the actual treaty legalising the diversion was signed. It is puzzling also because the state was reportedly forced to sign the controversial treaty in exchange for the majestic Idukki hydropower project. And it is even more perplexing because the three dams involved in the transfer—Parambikulum, Peruvarippallam and Thunacadavu—are all inside the territory of Kerala, but the land on which they stand and their operations are still under the control of the Tamil Nadu government.

In 1886, the Maharaja of Travancore signed the Mullaperiyar Agreement with the British administration in the Madras Presidency. By the terms of this agreement the Madras administration was granted the right to construct and maintain the Mullaperiyar dam located in the Travancore region of Kerala and divert the water to irrigate arid lands in Madurai region. This 111 year old agreement was evidently the precursor for the 35-year-old Parambikulam Aliyar Project treaty.

If these two treaties, the idea of ‘surplus water’ has been consistently misconceived. PAP is one of the many cases in Kerala that illustrate how vested interests have hidden facts from the public. The nine dams built on the eight tributaries of Periyar, Chalakudy and Bharathapuzha rivers, as part of the Parambikulam Aliyar Project, have made available a total of 33 thousand million cubic feet (TMC) of water for diversion. As per the treaty, Tamil Nadu is entitled to 16.5 TMC of water every year from the yield of

those three dams (viz, Parambikulam, Peruvarippallam and Thunacadavu) but in effect it is diverting the entire flow into its territory.

Tamil Nadu has appropriated the entire available water from PAP by forcing the three tributaries of the Chalakudy river to run dry for a stretch of anywhere between five to six kilometres from the dam sites. All these dried stretches lie in forested areas and are inhabited by tribal populations. Further, as the water is not released downstream, the Kerala Sholayar and Poringalkuthu hydropower projects on the Chalakudy river operate well below their installed capacity.

Conclusion

The diversion of water from Rivers Achencovil and Pamba to Vaipar will have long standing repercussions not only to the environment but also to the health of the people in the central Travancore. The idea that nature can be conquered and transformed according to human wishes carries within it the seed of human destruction. The human society should live in harmony with nature. Nature must be treated with respect and transformations must be gentle, non violent and sustainable. Hence the proposal for the diversion of water from the rivers is ecologically unsound.

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