

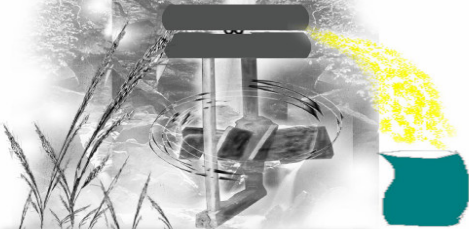
UPDATE COLLECTIVE

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DEVELOPMENT & ALTERNATIVES - ENERGY

A special issue on the Earth Day, April 2001



Dear Update Collective reader,

When you ask what does development mean today, you will get broadly two kinds of answers. It is some thing that nations needs, for which some have to sacrifice for it. Others would say why should we who are already marginalized pay the price of development, more over development for whom?

It is the marginalized sections of the Indian society, the sections who have been made powerless the dalits, the adivasis, the women, the minority communities the nomadic communities have been the worst victims of the "development" model ever since the big development programmes are carried out. Still further these sections and communities are becoming venerable as the liberalisation process is taking over, be it the power & industrial sector, fishing, weaving or agriculture, forest or those areas being the source of lively hood for communities depending on it.

The Update Collective, a monthly newsletter has sincerely tried to be the channel in a limited way to bring to your notice the life & struggles of the people for these basic human & livelihood rights.

The Update Collective has succeeded in bring the struggling peoples groups close and get to know each other across the country. It has served as a leasonning instrument. It has promoted by pointing the human & sustainable development practices, where people them selves decide how they want their development. Where sacrifice is not at the cost of the others but at the cost of their association & commitment to the people.

This particular issue on the Earth Day tries to focus on alternative sources of indigenous energy "Gharat" which is a traditional source of energy and environment friendly in our own ways. We appreciate all who have encouraged & supported us in trying to making this update collective more useful to the struggles of peoples.

Update Collective team.

Gharat: The Wheel of Life

"Water is a Mere Blind Force, though tremendous, it has to be guided by Proper Discrimination"--The Mahabharata

Energy and development are synonymous. The fact is evidently displayed in the Human Development Report-2000. India with an HDI rank of 132 among 174 countries has an energy consumption level of 276 kg per capita (equivalent to Coal). In contrast, the high rankers-USA, Japan, France have as high as 7951kg, 3962kg and 4222kg per capita energy consumption levels respectively. Taking this scenario within the context of inter-regional disparities in our country the hilly and Adivasi regions selectively rank low.

Within the overall context of sustainable development in the Himalayas, the energy sector plays an important role, although it is not well understood nor used to its full potential. Biomass fuels, primarily fuel-wood, dominate the overall mountain energy systems and the domestic sector, is the main consumer of energy. More recently, the

The people of Utrakhand say...,

The issue of progress and development is plain and clear in itself, people for whom the development is planned should fully be taken to confidence as partners in development. People of Utrakhand have been waiting for almost fifty years for their development, since the independence. But some how in the name of development the hills here are still thirsting for water and power. As they say this water produces electricity. Well what we know that for producing this electricity several villages in Tehri have been destroyed and will ultimately be submerged. Now, we hear that even water resources have been nationalized. Then what are the people here are actually left with? The forests of the people are taken away, the agriculture too is also being snatched away... be it in the name of dams or be it biodiversity. Before this earlier, we were self-reliant. We were engaged agricultural work, grazed our cattle and had our own Gharats (watermills). The life wheel moved without shouldering on any outside aid.

Gharats are a source of life for us – have remained and will remain till the Himalayas remain!

Technology is never born suddenly out of anywhere. It always develops from one stage to the other. However, since the last 200 years our Gharats are still a useful systems. Where does the reason lie? Who is responsible for it? or has it been a conspiracy – a deliberate attempt on the part of the outside forces? Can we really correct our earlier mistakes? This issue is an attempt to come face to face with these very questions.

use of non-renewable fossil fuels has started to increase considerably, among other measures through subsidies on fuels such as kerosene and diesel. However, the transportation and economics make the availability of fossil fuels in the difficult mountainous terrain quite questionable.

It is not that this question has not been raised at all. The Government and Non Government agency have touched the issue- but only from out side, while the answer, actually lies within the mountain system itself.

An analysis of just the water resources of the Himalayan region illustrates, that, about 11,00,000 million cubic meters water flows every year down the Himalayas offering a potential for generating electricity to the tune of 28,000 MW.

It is somewhat ironical that a region endowed with such great potential for harnessing hydropower should face an energy shortage. Average energy availability and consumption of an urban dweller is more than hundred times than that of a villager living in rural remote areas. The difference is even more intense in case of a Himalayan village. It is indeed ironical that the land that provides water and power to the country, itself lacks such a basic facility.

The potential of flowing water was realised long ago by humans. They designed many devices to tap this inexhaustible energy to meet their needs. Even though utilization of river water for transport, irrigation and domestic requirements date back to a couple of thousand years, it was only much later that humans learnt the art of harnessing the kinetic energy of a flowing mass of water to do mechanical work.

For many centuries, most mechanical work was performed by Waterwheels and Windmills and thus the word “mill” eventually became a synonym for any workplace where machinery was used.

Watermills, a traditional, eco-friendly use of water, have been used for grinding grain into flour since ancient times.

The oldest reference to a water mill was made by Antipater, one of the three Greek poets, around the year BC 85. This is a wheel revolving in a horizontal plane, connected to a rotating stone by a vertical spindle. The stone is used for crushing grain. Roman architect Vitruvius described the vertical water wheel in BC 27. The vertical wheel drives the load through a pair of gears and delivers far greater power than the horizontal wheel. Frenchman Daniel Joneaire began the first Niagara

water powered industry in 1757. He drew upon the flow of Niagara River in the State of New York, USA, to turn a water wheel for a sawmill.

In India, experts place the origin of ‘Gharats’ (Water Mills) somewhere in the North – Eastern region and around the Seventh century. But there is no consensus over the date. Currently “‘Gharats’” are in wide use in the whole of the Himalayan range and the North- East. The wide spread use of ‘Gharats’ and its popularity owe much to its simple and cost effective mechanism.

For long, ‘Gharats’, as socio-cultural centres were a source of relief in the tough life of the harsh mountain regions.

Although the use of this natural energy resource became even easier and more widespread in the rest of the world with the invention of the water turbine as early as in 1800's – ‘Gharats’ in the Himalayas gradually started sinking. The reasons can be attributed to - the Gorkha invasion, exploitation of the region by the Britishers for their army purposes and the imperialistic policies of our very own Indian Government.

The Energy Scenario and the Government

The world oil crisis of the seventies and the subsequent Gulf war reawakened the world including the Indian Government towards the importance of focusing on the renewable and non-conventional energy sources.

Therefore, recent years have witnessed a global trend in favor of a shift in focus away from conventional fossil fuels and towards renewable sources to meet the increasing demand for energy. In recognition and realization of the essential transition to a sustainable energy base, in the past quarter century, efforts have gone into the development, trial and induction of a variety of renewable energy technologies for use in different sectors of the economy and sections of society in India. It was precisely for this purpose that the Government of India took the farsighted decision even as early as the early 1980s to have an exclusive institutional mechanism for promoting renewable energy sources.

The government claims (Ministry of Non Conventional Energy Sources), that, India can even provide consultancy in all the areas of renewable energy. **The design, manufacturing and installation of Improved Watermills (‘Gharats’)** – forms an important component of the consultancy package being offered by the Government.

In spite of the creation of a Separate Ministry – namely the Ministry of Non-conventional Energy Sources including a separate department for micro-hydel (including ‘Gharats’) and provisions for providing consultancy services to even other countries – government in our country has failed to make a significant impact. This has been either due to institutional reasons (no training or technical support, owners not helped to develop their businesses) or technical reasons (designs not fully understood and transferred, therefore systems were not specified and installed appropriately).

‘Gharats’ – a source of life in the Himalayas

The watermills of this hilly region are an essential and important critical source of energy in remote areas. In India, these watermills are not only used for grinding grains into flour but in a few places are also used for providing electricity.

Gharats are traditional water mills of the vertical shaft type, evolved over thousand of years and used essentially for grinding. Traditionally, channels diverted the water from stream/river to the mill. A device is also incorporated in the channel to divert the water if the watermill is not in operation. This device to the main stream re-diverts water. A wooden flume brings the water discharge from the channel to the water wheel, which is one of the major components of the watermill. It rotates around a tri-union axis. The central part of the water wheel is cylindrical, having a large diameter at the middle, which gradually reduces towards both ends of the wheel. Flat blades are fixed in the central part of the wheel, at an angle of 65 to 70 degrees. These vary in number in different ‘Gharats’ from 11 to 21. Jets of water strike these blades and rotate the wheel, which is fixed length wise at the axis to transmit the entire load to an iron base. A bar is inserted into the wheel for an adequate grip. At opposite end from the cylindrical axis, a long shaft connects it to the upper part of the grinder stone. A groove is made into the upper grinder to set a tapered iron piece, which holds the shaft and grinder simultaneously. An iron base bears the load of the system, which in turn diffuses it over the horizontally laid plank. One end of the plank is attached to an adjusting lever, which moves upward and downward. The lever governs the distance between the moving and the stationary part of the grinder. An upward movement of the lever allows for coarse grinding while the downward is for fine grinding.

This indigenous technology is built and maintained by the miller himself using local materials. However

in recent years, ‘Gharats’ have started to fall into disuse. Owners have come down to the plains to seek more lucrative employment (?), more effective diesel powered mills in nearby towns have reduced their market, and major deforestation has caused some water sources to disappear.

There are over 5,00,000 watermills in the Indian Mountain Regions (IMR). Technological up-gradation through intervention by voluntary sector has improved the functional efficiency of the watermills and also made it possible to generate power. On an aggregate basis “Gharats” can lead to a potential power generation of 2500MW/hr or 40 million units of electricity and a cash generation of Rs. 1300 million per hour.

However if this abundant and renewable waterpower resource could be exploited more effectively with appropriate and modernised equipment, it could play a key role in moving towards a sustainable economic development in the hilly regions. Upgradation of technology in areas like watermills can be great source of employment generation as they are labour intensive. Improving traditional watermills would be highly beneficial in the following regard:

- By increase in productivity and income generation for the millers.
- Local communities by providing more efficient agro-processing services, plus electrical services such as evening lighting, water-heating, irrigation pumping at night, using looms etc.
- Would reduce the level of manual work of the women and reduce the burden of walking for hours to reach the electric or diesel machines.
- Manufacturers will have the increased possibility of producing and selling simple standardized equipments on a large scale.
- Local workshops that will supply the components and spares or provide repair services.
- Displacing the environmentally harmful emissions and reducing the excessive reliance on wood for fuel.

At present there are approximately 5,00,000 watermills in the mountains. Considering a family strength of 4 per family, 20,00,000 people will benefit directly by technological up-gradation of watermills. Considering an employment opportunity of 3 persons per watermill, another 15,00,000 people can be provided employment as well.

In contrast to the above scenario, although a mini hydro plant may be able to increase the energy

output at a watermill site by several times, but it will inevitably involve – imported components, manufacture and installation by trained engineers, specialised spare parts, transport of heavy equipment to remote areas and high capital costs. In the long run this would prove to be unsustainable without accompanying advances in local and regional infrastructure, local skills and engineering facilities. A sustainable approach would therefore imply the marrying of the modern know-how with the local context of the hills.

This source of energy, which is eco-friendly, and has been an important socio-cultural component of the hills, needs patronization. It needs up-gradation, but with a technology that is both affordable and locally acceptable- both technically and culturally. Ignoring these factors has sometimes led to the transfer of efficient and powerful technologies, which could not be maintained or owned by the local communities unless supported by foreign funded programme. The upgrading of traditional watermills is an effective and sustainable way of meeting the energy needs of a major section of the rural poor. The need for sustainability requires starting at the point of development and moving forward in a way, which is close to the people, affordable and brings immediate and worthwhile benefit. Overly ambitious technology plans, which are too sophisticated for local expertise to repair, have always proved to be a fiasco.

In spite of its tremendous potential, this ancient source of energy locally known as “Gharat” has largely remained neglected. With the advent of energy from diesel and electric sources, the importance of ‘Gharats’ was further relegated to the back seat. Although 40,000 of the 70,000 watermills in Uttarakhand have been closed down due to the negligence of the government, the mechanisms of State continue collecting taxes for it.

The disparity between potential and current levels of most renewable energy use calls for innovative energy policies and programs for the Himalayan range.

It is indeed the need of the hour to formulate an independent water policy for the Himalayas and the watermills in particular need to be given a due place in the district planning process. This policy could encompass technological up-gradation of watermills, decentralization of technical institutions, renovation of existing micro-hydel projects, abolition of taxes on water-millers and also land rights to the water-millers.

Now, even if we just confine ourselves to Uttarakhand here – then a hill state has definitely been politically formed. Supposedly the power has come closer to the hills now... closer from New Delhi and Lucknow. Till the very recent past – the attainment of separate statehood - our erstwhile leaders and we had never shied away from blaming the ‘others’ for the pathetic scenario in the hills.

However the new statehood and also the Panchayati Raj Act seems to have decentralized the power now. But the need of the hour also calls for the essential decentralization of water and electricity. Producing electricity on a small-scale...technology at / for the local level... this appears to be the only path to economic development. All this needs very strong political will and farsightedness. Yes! Definitely water is a national resource. But aren't we also a part of this NATION? ...We also want a share in its development....

Information taken from various concerned websites and books for the compilation.

Manisha Joshi and Prem Bahukhandi, members of the forum have contributed in putting up the above information. For any further information and solidarity please contact:

“Friends of Uttarakhand” is a forum of activists, research scholars from various institutions and universities, trying to create an environment of reasoned debate and discussions based on facts rather than mere feeling about development choices, policies, strategies and programmes.

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