COMMUNICATION AND ITS ROLE IN PROMOTING MICRO HYDRO BASED GREEN ENERGY SOLUTIONS

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ABSTRACT

Appropriate and timely development communication through media helps in raising people's awareness on various ongoing developmental processes, which further develops their understanding about new innovations and their role in overall socio-economic development. At time it has been observed that within media there are limitations to develop developmental communication that talks about various development issues and prospects related to social, economic and environmental concerns.

With the increasing global awareness and advocacy towards adopting green energy solutions the governments various countries are also aligning their efforts towards renewable energy technologies and this needs wider dissemination through media as well. The development of hydro project remained a key challenge due to various social and environmental reasons in India also, and as a solution to this micro hydro technologies like Ultra-Low head based micro hydro units have been introduced by UNIDO as decentralized renewable green energy solution.

This paper highlights the role of media in disseminating the information through various means to relevant stakeholders including among rural masses such initiatives in micro hydro system development that could help in policy formulation, employment generation, poverty reduction and overall environmental benefits to the ecosystem functions.

INTRODUCTION

The roles of advocacy, communication and community mobilization are becoming increasingly valued as a means of achieving more green energy solution. I shall take UNIDO’s initiatives to promote ULH-MHP in India as a representative example. After that we will follow some other case study how they achieved the ideal goals being expected with the role of communication and advocacy initiative through various mass communication tools (Media).

This paper illustrates how advocacy, capacity development, community mobilization, and effective communication can initiate and support for green energy solution’s initiatives being taken By United Nations Industrial Organization UNIDO to promote Ultra Low Head Micro Hydro Power Projects (ULH-MHP) as its fist pilot presentation in Uttarakhand, India. The paper does not guarantee that the experience shared here will automatically work in other communities while promoting ULH-MHP, since many local factors are involved. However, it provides an example of how a community mapped out the most effective advocacy, capacity
development and community mobilization, and communication strategies to suit their own circumstances.

Advocacy and communication activities need some form of media or channel of communication (McKee, 1992), such as mass media, community media, and interpersonal communication. While much of the communication effort on solutions of green energy generation is concerned with transmitting a series of messages, it should be stressed that, to be effective, communication should be understood as a two-way process, with “participation” and “dialogue” as key elements. Program communication, advocacy, capacity development, and community mobilization originate from effective communication. Program communication is concerned with informing, and creating awareness among, the general public or particular communities about the challenges, and empowering them to take action. Program communication also works to create an environment through which communities – particularly affected communities – can discuss debate, organize, and communicate their own perspectives about the problem.

Lots of innovative efforts are in practice to generate safe and green energy. The initiatives are scattered and diversified throughout the globe. That is the very time to disseminate such activities so that masses accept it widely. Because it could be the best way to supply power and the obviously expected and deserved accomplishment in masses life. Unfortunately media haven’t focused it adequately and strongly. Nevertheless there are stories to narrate their tale of success and to inspire others.

Why does the UNIDO initiative ULH-MHP need to communicate?

- **Visibility** - people need to understand who we are, what we do and why we do it
- **Credibility** - we represent all the people of the world
- **Transparency** - public accountability to our donors and stakeholders
- **Advocacy**
- **Fund Raising** - resource mobilization
- **Public education**
- **Ensuring accurate information on relevant issues**
- **Promoting values, protocols and standards**
- **Risk management** – if we have good media relations then if something bad happens we already have a solid reputation and are in a better position to respond.

The strategy aims of communication and advocacy initiatives of any development program:

- Coordinate advocacy on key messages,
- Build a stronger corporate reputation for the Program in the country (mitigating risk)
- Strengthen inter-agency cooperation in the field of communications
- Formalize channels for inter-agency information sharing
- Achieve positive media coverage which shows how UN ULH-MHP programmes are delivering results
- Establish mechanisms for results based monitoring and evaluation of join
The role of advocacy, community mobilization, and communication in promotion of ULH-MHP in Uttarakhand, India

**Description of the project/activity**

The project was implemented by United Nations Industrial Development Organization (UNIDO) with support from Japan government is working on the pilot demonstration project for ultra low head-micro hydro power project in Uttarakhand India. The basic purpose of project is to demonstrate success model of generating green energy for productive use by local community. After installing first demonstration site. UNIDO is working on its community model. Community have not only welcomed Unido but enthusiastically participating in applying the business model.

The overall objective of the project was to demonstrate alternative green energy solution especially or the rural areas and to connect the generated power with the livelihood generation with the help of community based model in India.

**Methods used in advocacy, mobilization, communication and capacity development**

Communication, mobilization and motivation mechanisms were implemented at the community level by community facilitators, NGOs, SHG members, and local authorities, all supported by the use of appropriate local mass media.

**Changing Mindset of authorities for the micro hydro initiatives**

This was composed of three stages. Namely; - Changing the typical mindset of the mass leaders about ULH-MHP which they don’t take in account to become energy surplus in place of energy deficit country/state.

Advocating the safer, greener and easier option of decentralized energy generation to cope up with the increasing power requirement especially in rural areas. Because this technology requires nominal of zero civil work. It is completely eco friendly technology.

To make appropriate change in the policy and to institutionalise the UNIDO initiative. We are happy to share that MNRE of India has incorporated ULH-MHP in its guidelines and given its assurance to form Watermill development centre in Uttarakhand and Himachal Pradesh.

**Preparing Database**

This activity is a continuous process. The project co-coordinator initiated a system of filing, where important information about policy documents, framework, areas need to emphasising, capacity building, Master plan survey and pilot demonstration in three deferent sites, means along with three different communities and geographies in Uttarakhand.

**Friends of ULH-MHP club**

This activity involved preparation of pro ULH-MHP technology technical experts, institutions individuals, officials, media organizations, and communities in order to proceed firmly and sustain the project successfully.
Smooth and frequent internal communication is also very important

It very important or sometimes it becomes the most important for any development program that the implementation body has a smooth, free flowing, strong and two way information sharing system for organic unity and uninterrupted swiftness in the program implementation.

Production and distribution of IEC Materials

IEC materials were printed, and distributed throughout the course of the phase of the project. The project team analyzed the templates pre-tested copies of posters from Raising Voices. The team found them suitable for awareness work. More copies were printed. These materials were distributed on community events; follow up visits, trainings, and in schools through teachers and volunteers. The IEC materials included booklets, and posters.

Days of Activism

This activity involved facilitating visiting groups at the installation site. Organising seminars, awareness programs, orientations program and mission meetings. Total 200 visitors from local universities and communities to national and international visitors have visited the first installation so far.

Newspaper (media) articles

News paper articles were published in local and national newspapers and magazines. The articles were mainly exposing the initiative, technology and successful operation of project.

Training Local Institutions

- Facilitating agencies
- Support Visits to Installation sites
- Responding to urgent action cases
- Stakeholders participation
  - The participation of stakeholders was ensured through recruitment of more volunteers from the communities. These volunteers represented the rest of the community in planning the activities of the project.

An analysis of Achievements and Challenges

- Specific Achievements
- The challenge
- Lessons learned

CONCLUSION

The model of ““Advocacy, community mobilization and communication in promotion promoting ULH-MHP by UNIDO in India, Uttarakhand” could be the ideal strategy and role
of mass communication to promote any similar program of “Micro Hydro based Green Energy Solutions” however local circumstances could not neglected.

Only media organizations will spread the concern throughout the globe, expressed by those youngsters?

The International Essay Contest for Young People is one of the peace education programs organized by the Goi Peace Foundation. The annual contest, which started in the year 2000, is a UNESCO/Goi Peace Foundation joint program since 2007. Here are the abstract of their prize winning essays in this contest.

**Building a Smarter Planet**

Divya Gopinath  
(Age 11, USA)  
Seven Bridges Middle School  
He is a typical American, and dependet on energy. But he has serious concerns for the shrinking feasible reservoir and want to find alternative and green energy solution inventeate and practiced widely.

**Electricity for a Change**

Amit Jung Himali  
(Age 11, Nepal)  
Siddhartha Love Dale  
There's a lot of power cut off in our place, Pokhara. The production of electricity is very less as compared to the demand. We live in the urban areas and we are having such problems than what must have been to others living in rural areas of western Nepal? Most of the villages remain dark and they are not able to have the facilities of electricity.

The people there have been deprived from proper facilities of quality education which has not made them competitive and capable. So, most of the rural people are not able to have equal opportunities and exposures. They are not able to get admission in good colleges and hence can't compete for better jobs and chances.

**Electrical Outages and Influenza**

Motoharu Fuchikawa  
(Age 10, Japan <Living in India>)  
New Delhi Japanese School  
"Hurry up and close it!"

My mother reminded me sharply. Oh no, I've done it again. I hurriedly close the fridge. Habits from Japan die hard and I do it time and again. I'm living in India because of my father's work and electrical outages happen all the time here. Food goes off if the outage exceeds four hours
so I understand why my mother gets upset. From her perspective, opening the fridge during an outage is outrageously mischievous.

**Let It Light the Darkness: A Dream Comes True**

Adeline Tiffanie Suwana  
(Age 12, Indonesia)

Jubilee The chirping birds, fertile rice fields, clean-fresh-air, the clear blue sky and the shadow of children in the friendly community of Cilulumpang Village in the mountains of South Cianjur give me energy and power to reach them although I have to walk along the 3 miles terrain. Cilulumpang is the name of hamlet in the village of Cempaka, Mekarjaya that is reachable within 4 hours drive from Jakarta where I reside and 2 hours walk to reach it. The children and community of Cilulumpang helped me to assemble the turbine into position which would continue to revolve processing energy from the water into electricity.

The power which we get from the 18 metres head of the waterfall combined with the 14.16 litres per second flow(volume) of the waterfall will come into:

\[
\text{Power} = \text{Head} \times \text{Flow} \times \text{Gravity} \\
= 18 \times 14.16 \times 9.81 = 2,500 \text{ watts}
\]

But, the efficiency of around 80% from 2,500 watts is expected from the mechanical energy into electrical energy which produces electricity for Cilulumpang. Forty families with children are prioritized to having the electricity with the power of 50 watt/family. Living with electricity will provide a better life and development to the village. More development activities can be carried through with electricity that is previously impossible. This is definitely promoting better quality of life and economic growth to the villagers. At the same time, we are utilizing an environment-friendly energy that does not increase the amount of carbon dioxide to the atmosphere, which worsens the greenhouse effects; as earth's temperature rising up.

**Case Study - 1| Rural Nepal**

**Microhydro Drives Change in Rural Nepal**

June 21, 2012, (The New York Times) BAGLUNG, NEPAL — In Rangkhani, a remote mountain village in western Nepal, a 12-hour walk on steep dirt roads from Baglung, the district’s chief town, families until a decade ago used kerosene and butter lamps to banish the darkness when dusk fell.

Communication and health care were poor. Work, apart from traditional farming and small trade, was scarce. But since 2001, a microhydro project has harnessed the tumbling waters of the nearby Kalung Khola river to provide electricity for Rangkhani and neighboring villages.
Electricity has brought major changes to village life. Tul Kumari Sharma, 33, a mother of three, now runs a small grain mill powered by electricity, no longer grinding grain by hand as she did before.

Life with electricity is “like heaven,” Ms. Sharma exclaimed. Daughters-in-law, who bear the brunt of housework in Nepal, used to be thin and ill: These days they are “quite healthy,” she said.

Drona Ban, 28, said he used to make $2 a day doing casual labor: With access to electricity he started a noodle-making workshop and now earns a profit of as much as $8 a day.

The World Bank estimates that Nepal’s swift-flowing torrents could supply as much as 83,000 megawatts of electricity through hydro power generation from Nepalese rivers.

“Nature has given us tough terrain: It’s difficult for infrastructure,” said Bhupendra Shakya, a renewable energy expert in Katmandu.

“But it’s suitable for hydro,” added Mr. Shakya, who works with Renewable Energy for Rural Livelihood, a project run jointly by the Nepalese government, the U.N. Development Program and the World Bank.

When the Kalung Khola plant was built, the villagers at first did not believe that water could create electricity. Khagaraj Sharma, 48, a school teacher, recalled in a recent interview how 150 people had gathered at the small powerhouse for the startup ceremony. All eyes were fixed on a light bulb outside the one-room concrete shed housing a generator powered by running river water. When the bulb glowed, villagers cheered and danced.

The micro hydro plant in Rangkhani cost about 2.6 million Nepalese rupees, or $29,000, to plan and build, and generates 26 kilowatts of electricity for more than 1,000 people. A “run-of-the-river” plant powered by water channeled directly from the fast-flowing stream, without any containment dam, it flooded no land and creates no greenhouse gas emissions. After spinning the generator’s turbine, the water feeds back into the river downstream.

Micro hydro power plants are defined by the government’s Alternative Energy Promotion Center, the umbrella organization for the renewable energy program, as those generating less than 100 kilowatts of electricity.

Micro hydro plants “do not have major environmental impact compared to large hydro and storage hydro,” said Rabin Shrestha, senior energy specialist with the World Bank in Nepal.

At first, villagers used electricity chiefly for lighting. Then, with guidance from local and international agencies, new businesses sprouted, and incomes started to rise.

Small grain and saw mills now operate in Rangkhani. Chilling vats keep buffalo milk cool before it is carried in 40-liter, or 10-gallon, barrels to a processing center 10 kilometers, or six miles, away. Shops and modest roadside restaurants have refrigerators to keep food and drink cold. Mobile phone towers have been built.
On a recent day an old village woman, carrying an enormous bundle of green branches on her back, was talking on her mobile phone as she hiked along a cliff-hugging road.

Hydro power accounts for about 90 percent of Nepal’s electricity. Yet electricity itself is only 2 percent of the country’s total energy consumption, according to the Center for Rural Technology, a nongovernment development organization based in Katmandu. Nepal has a bustling tourism industry and cities with modern amenities, but 84 percent of its population is still rural. Burning biomass — wood, dung or other organic matter — accounts for 86 percent of Nepal’s total energy consumption. Deforestation has been a major problem for decades, while pollution from burning biomass is getting worse. Only about 56 percent of people use electricity at all.

Even in the towns, power supply is a pressing problem. During Nepal’s civil war, from 1996 to 2006, construction of generating plants and other infrastructure ground to a halt. In recent years, 14-hour power cuts have become routine, even in Katmandu, the capital.

For remote villages in Nepal, it would take years or decades to connect to the national electric grid. Microhydro power plants like the one in Rangkhani can bridge the gap.

An estimated 2,200 microhydro plants, generating a total 18,000 kilowatts, have been built in Nepal since the 1970s, according to Nepal Micro Hydropower Development Association. Funding and support comes from Nepal’s government, as well as international agencies like the U.N. Development Program, the World Bank and Norad and Danida, the international aid agencies of Norway and Denmark, respectively.

Unlike Nepal’s blackout-plagued urbanites, Rangkhani’s villagers have uninterrupted power, rendered more secure by the installation of a minigrid last year, interconnecting with five other nearby micro hydro plants.

Establishing micro hydro plants in Nepal takes about 21 months, including a feasibility study, review, government approval, construction and installation. For U.N.-supported projects like those in the Renewable Energy for Rural Livelihood program, the first six months are devoted to educating the local community about the plant and electricity, and creating community organizations to help manage operations.

“Community mobilization” is critical, said Mr. Shakya of Renewable Energy program. “It’s unsustainable without them.”

Today, there is a strong emphasis on giving communities responsibility for plants, training local support technicians, and helping villagers build up small businesses to increase incomes and electricity demand to make plants financially viable.

A small health clinic has expanded, adding microscopes and an X-ray machine. With electricity, machines in a small workshop make fragrant cakes of soap for sale in city shops. In
a small studio a 40-watt licensed FM radio station airs news, music, and public service announcements. At least 100,000 people in two districts can hear the broadcasts.

Electricity from the micro-hydro plant powers a sewing machine and a TV

Tribhuvan Secondary School has 15 new minilaptop computers funded by Winrock International, a U.S. nonprofit. Teachers there said that before the village had electricity, only about half the students passed their final high school examinations. Now, 80 percent pass. Children spend less time on household chores, like gathering firewood, and more time studying, the computer teacher, Kamal Paudel, said.

Ram Bahadro Kunwar, 26, opened a poultry farm last September. A large shed on a riverbank houses 1,000 clucking chickens. Electricity helps incubate chicks and provides lighting to tend them at night.

Mr. Kunwar says he was a Maoist rebel during Nepal’s civil war and he confesses to being surprised that he is now running a small business that earned him about $1,000 when he sold his first batch of chickens late last year. As a guerilla soldier, Mr. Kunwar thought only “about changing the country,” he recalled. With electricity, change is indeed happening in rural Nepal — but in a different way than he had imagined.

Case Study - 2 | Pakistan

Small hydro-power units for remote villages

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The hydro potential in Pakistan has been estimated at 46,000 MW; the present installed capacity is 6,459 MW. According to the ‘Policy for Power Generation Projects Year 2002’, Pakistan plans to commission 12 large scale hydro power plants, besides other relatively small scale projects.
Large hydro power generation projects involve a number of social, political and technical issues.

There is also strong evidence to show that such large schemes emit greenhouse gases, often equivalent to fossil fuel power plants, due to the decaying of biomass covered by the reservoir.

However, small hydropower plants have emerged as a desirable option, especially for hilly terrains where natural and manageable waterfalls are abundantly available.

Being environmentally benign and having a small gestation period, small hydro resources receive worldwide attention both in developed and developing countries to augment energy generation. Small hydro plants offer a wide range of benefits, especially for rural areas in developing countries.

Development of small hydro power plants (SHP) around the world has increased substantially in the last 10 to 15 years because of limited and fast depleting fossil fuel resources such as coal, oil and natural gas.

The world’s installed capacity of small hydro plants is 47,000 MW, against an estimated potential of 180,000 MW. The development of small hydro projects appears strong in many parts of the world, especially in Asia, where it accounts for more than 19,000 MW of energy. Within Asia, China alone contributes more than 15,000 MW to the grid. There are over 420 small projects producing 1423 MW in India.

These hilly areas receive a significant quantum of precipitation every year. Hence, water flowing through small rivers and streams is a potential source for small hydropower generation in order to solve the problem of energy shortages in such geographically discouraging areas. In fact, Pakistan Council of Renewable Energy Technologies (PCRET), a
department of the Ministry of Science and Technology, has implemented 290 micro-hydro power (MHP) schemes in FATA and the northern areas with a total capacity of 3.5MW, ranging from 3-50kW per plant, with the participation of local community. All of these plants are run-of-river type in the low (four meter) to medium (30 meter) head range.

Similarly, Aga Khan Rural Support Programme (AKRSP) has constructed 171 micro-hydrel units providing electricity to around 17,000 households in the remote and isolated region of northern Pakistan, and currently provides 11,000 households with electricity in very remote locations.

Once the plant is installed, the local community takes the responsibility of operating it. These plants provide electricity mainly for domestic purposes. Local people have installed agro processing plants for flour grinding, rice husking, lathe, in the power house. Such units are run during the day time, directly from the turbine shaft. The electricity produced through micro hydropower in the country is in the range of 5-50 kW.

Recently United Nations Development Programme (UNDP), the Alternative Pakistan Energy Development Board (AEBD) and German Technical Assistance Agency (GTZ) launched a Rs4.5 million project to promote adoption of renewable micro-hydro energy for the poor rural communities in Northern Areas.

The substitution of conventional sources of energy like traditional biomass for cooking, diesel generators, kerosene lamps and biomass stoves with renewable energies like SHP help to decrease carbon dioxide emissions and also contribute to poverty alleviation and economic development by supplying the electricity needs for lighting, water pumping and operating small workshops.

These projects benefit the local environment by using a natural resource to generate much needed electricity without depleting the quantity or quality of that resource or harming aquatic fauna and flora.

The access to electricity provides women with an opportunity to improve their social and economic condition. Women in rural areas use time saved and extended working hours due to availability of light to manufacture traditional handicrafts for domestic and commercial purposes. Many children, especially young girls use the extra hours available during the nights to study.

Further, the government should launch new micro and Pico-hydro energy projects through Town council and Union council respectively.

Case Study - 3 | Peru

Micro-hydropower bringing services and income to communities in the Eastern Andes

The Eastern slopes of the Andes in North Peru are among the least developed parts of the country, and the difficult terrain and scattered population mean that few people have grid electricity.

However, there is a large potential resource of hydroelectricity in the many rivers and streams.
Practical Action, Peru has installed 47 micro-hydro schemes, with average electrical power 33 kW, to provide metered electricity to about 5,000 families. Electricity from the micro-hydro provides good quality lighting, refrigeration and entertainment in homes, and improves education and health care provision through the use of electrical equipment. Surveys suggest that about 25% of households have started or expanded businesses as a result of having electricity, and many people who left the villages because of better employment opportunities in the cities have come back and started local businesses.

A village micro-enterprise of Practical Action-trained technicians is responsible for the day-to-day operation and maintenance of the micro-hydro. (Practical Action (formerly known as the Intermediate Technology Development Group) is an NGO founded in 1966 by Dr Fritz Schumacher. It has a headquarter in the UK).

Benefits

Previously, village people moved away to start businesses in places where the infrastructure was better, but the electricity from micro-hydro schemes has brought them back. Some villages have doubled in size: for example connections to the micro-hydro scheme in Tamborapa have increased from 200 to 400 homes, and 90% of this increase was due to people returning to the village and bringing their businesses with them.

The businesses which have started as a result of the micro-hydro electricity include restaurants and bars, bakeries, furniture makers, welders and internet cafes. A new milk cooler in Cochin collects milk from local farmers and sends it to a processing plant in Cajamarca. This generates additional income for farmers. An ice-cream factory now operates in Cochin during the hot season. The availability of electricity has many educational benefits. Schools can use computers, photocopiers, audio-visual facilities and amplifiers to enhance their bands. Children are now able to study at home in the evenings with electric light. Teachers are more likely to live in the communities where they work if electricity is available, and contribute more to community life: some also set up enterprises such as internet cafes in their spare time.

The electricity from micro-hydro systems provides many health benefits. Health centres can operate vaccine refrigerators, maintain records on computer, and use radio links for communication, as well as offering a generally improved service through use of electric lights. Dental services have started. A health laboratory can now use equipment such as iceboxes, fridges, centrifuges, humidifiers, sterilisers and electric boilers.

Electricity makes it possible to use kitchen appliances such as fridges and food processors, and brings the possibility of radio, TV and DVD players for home entertainment.

Technology developed by Practical Action is used in many countries, including Bolivia, Guatemala, Sri Lanka and Nepal.
**Case Study - 3 | India**  
**Sparkles in the mountains: ‘Indigenous Hydroger’**  
**Report by ‘Eastern Mirror-Journalism for Justice’**

It is a labour of love. For 10 years, the team at Nagaland Empowerment of People through Economic Development (NEPeD) held this experiment close to their hearts- a daunting task that is lighting up lives in far-off villages in the mountains of Nagaland today. The hydroger has made way for many to diversify their income through new activities and reduced women’s day-to-day drudgery.

**What is a Hydroger?**

It is a big dynamo-type generator of electricity that can produce power at an installed capacity of 3 and 5 Kilowatts from water running down a stream. It is an indigenous version of the Chinese hydroger which the NEPeD team got hold of in 1994. After a series of experiments with engineering and re-engineering, NEPeD and Dimapur-based Mini Tool Room (MTR) came up with their very own hydroger in 2008.

Depending on the site and size, it takes about Rs. 1 to 2 lakh to install a hydroger machine and electric load controller. NEPeD has installed it in 25 sites in different villages of Nagaland and several other states.

After the hydroger is installed, the villagers are trained in its handling and care. The people also ensure that forests around the site and the catchment of the stream is maintained, a step that can go a long way in securing hope for sustainability of the project.

Watch the video to know more about the Hydroger and how it has brightened lives. www.youtube.com/watch?v=IZOSg2VrNJY
CONCLUSION

Larger hydro plants, especially those that involve the construction of dams, can have serious impacts on local communities and the upstream and downstream environment. There are many examples of hydro plants around the world where whole communities have been moved, lost their livelihood or had their health compromised. Reservoirs produce greenhouse gas emissions because of decaying vegetation from flooded, particularly in tropical regions.

China has developed more than half of the world's small hydro capacity. In 2004 alone, the country added nearly 4 GW of small hydropower. Other countries actively pursuing small hydropower include Canada, Australia, Nepal and New Zealand.

Small hydropower is often used to supply electricity in remote or autonomous locations, such as rural villages that are not connected to the electrical grid. Hydropower may replace existing diesel generators or provide a community with electricity for the first time.

India is endowed with economically exploitable and viable hydro potential assessed to be about 84,000 MW at 60% load factor. In addition, 6,780 MW in terms of installed capacity from Small, Mini, and Micro Hydel schemes have been assessed.

In the section of micro hydro, Ultra Low Head-Micro Hydro Power is one such green technology which is unique, can be mobilised relatively quickly, environment friendly, compact and portable, dual mode connectivity and needs minimal civil work. Such technology is being applied in Uttarakhand state of India by UNIDO with an aim to promote green energy over traditional energy sources and enhance livelihood generation with sustainable development.

REFERENCES

1. McKee, N (1992); Social Mobilization and Social Marketing in Developing Countries.
2. Hawe, P. et al (2000); Indicators to help with Capacity Development in Health Promotion;
7. Paris: Communication and information sector, UNESCO.

Web links:

HTTP://WWW.DAWN.COM
HTTP://WWW.NYTIMES.COM
www.itdg.org.pe
http://www.grandchallenges.ca
www.akvopedia.org/
www.microhydropower.net
www.practicalaction.org/micro-hydro-power
www.slideshare.net/rajesh2210
www.hydroworld.com
www.mnre.gov.in
www.ashden.org/micro-hydro
www.ripublication.com
www.keralaxenergy.gov.in
www.indiaenergyportal.org
http://www.ripublication.com/india
http://timesofindia.indiatimes.com
http://www.youtube.com
http://www.goipeace.or.jp