Energy

MOUNTAINS ARE A KEY SOURCE OF ENERGY FOR EVERYONE ON THE PLANET. THEY PROVIDE BIOMASS FUELS, SUCH AS WOOD, AGRICULTURAL RESIDUE AND ANIMAL DUNG, AS WELL AS NON-RENEWABLE FOSSIL FUELS, SUCH AS COAL AND GAS. BECAUSE OF THEIR PHYSICAL FEATURES, MOUNTAINS ARE ALSO A RICH SOURCE OF RENEWABLE ENERGY, SUCH AS HYDRO, SOLAR AND WIND POWER. MAKING USE OF THIS LARGELY UNTAPPED ENERGY SOURCE COULD HELP SHIFT WORLD CONSUMPTION AWAY FROM FOSSIL FUELS, WHICH ARE A MAJOR CAUSE OF GLOBAL WARMING. BUT MANY MOUNTAIN COMMUNITIES CONTINUE TO COOK AND HEAT WITH DWINDLING SUPPLIES OF FUELWOOD AND OTHER NON-RENEWABLE FUELS, WHICH ARE HARMFUL TO BOTH HEALTH AND THE ENVIRONMENT. MUCH OF THE CLEAN, RENEWABLE ENERGY DERIVED FROM MOUNTAIN AREAS IS EXPORTED TO LOWLAND AREAS WITHOUT BENEFITING MOUNTAIN COMMUNITIES. MOUNTAIN PEOPLE NEED A VOICE IN THE PLANNING AND DEVELOPMENT OF ENERGY POLICIES AND PROGRAMMES THAT RECOGNIZE THEIR NEEDS AND THE VULNERABILITY OF MOUNTAIN ECOSYSTEMS.

LEFT OUT IN THE COLD

Energy is crucial for life in mountain areas, but supplying that energy poses special challenges. Conventional energy networks, designed to serve densely populated areas, are often impractical for small, isolated mountain communities. The cold climates of mountain regions mean that more energy is required for heating than in lowlands. And energy requirements are growing fast as mountain dwellers seek modern appliances and local industries, especially tourism, expand. Demand is also rising in lowland regions, which look to mountains to supply much of their energy. Mountain dwellers receive little compensation for electricity, wood and charcoal derived from their homelands. But they do bear the brunt of the negative social and environmental effects.

FUELLING GROWTH FOR MOUNTAIN PEOPLE

An adequate and reliable supply of energy is a prerequisite for sustainable mountain development. Yet many energy sources currently used in mountain regions have a damaging effect on fragile mountain ecosystems. Biomass fuels provide more than 90 percent of energy in mountain regions, with fuelwood making up the bulk of this. But supplies are threatened as populations grow, and there are other drawbacks in using biomass fuels. Smoke from the fires and stoves used for cooking and heating pollutes the environment and damages the health of mountain people. The use of animal dung and agricultural waste as fuel deprives the soil of valuable organic fertilizer. To meet growing energy demands, some mountain communities are turning to non-renewable fuels such as kerosene, diesel and dry-cell batteries, which are harmful to the environment. The need is for energy policies and programmes that take into account the vulnerability of mountain ecosystems and the nature of mountain communities. These policies and programmes must be developed by mountain dwellers themselves to ensure that technologies match lifestyles and meet people's real needs.

2002 International Year of MOUNTAINS

We are all mountain people

www.mountains2002.org

Key facts

▲ Fossil fuels – oil, coal and gas – provide the world with most of its energy. But burning these fossil fuels is the primary source of carbon dioxide emissions, which cause global warming. It has been estimated that fossil fuel reserves may last for only another 40 or 50 years. Finding alternative sources of energy is therefore a matter of great urgency.

▲ An average mountain-dwelling family in Nepal consumes 3 500 kg of wood a year for cooking. Fourteen million tons of wood are burned by Nepalese mountain dwellers every year to meet household energy requirements.

▲ Mountain regions produce far more hydropower than they use. While Norway has developed more than 80 percent of its hydropower potential, Nepal and Ethiopia have developed less than 1 percent of theirs.

▲ Canada is the largest producer of hydropower in the world. The Colombia River basin has 13 dams.

▲ Large hydropower installations have their drawbacks. More than 20 percent of freshwater fish species around the world are considered endangered as a result of dams.

▲ In 1995, the cost of electricity generated from gas and coal was between 3 and 4 US cents per kilowatt-hour, nuclear power cost 10 to 14 cents, wind power was 5 to 7 cents and solar photovoltaic power was 25 to 40 cents. But the price gap between non-renewable and renewable energy is closing. By 2030, wind, solar and biomass power may cost less than fossil or nuclear fuels.

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American Solar Energy Society
www.solartoday.org

Earth Trends – the Environmental Information Portal
www.earthtrends.wri.org

Energy and environmental technology
Sustainable Development Department, FAO
www.fao.org/sd/EN2_en.htm

International Centre for Hydropower
www.ntnu.no/ich

International Centre for Integrated Mountain Development
www.icimod.org/focus/energy/energylinks.htm

Mountain Forum
www.mtnforum.org/resources/library/liblevels/lib413a.htm#energy

World Energy Council
www.worldenergy.org/wec-geis

World Renewable Energy Network
www.wrenuk.co.uk

GREEN ENERGY – CLEAN AND PLENTIFUL

By virtue of their altitude, gradient and other physical characteristics, mountains are the world's powerhouses for clean, renewable energy. Their towering peaks have tremendous potential for producing hydro, solar, wind, geothermal and other forms of power for mountain communities and populations downhill. But only a fraction of the world's mountain renewable power resources is being harnessed. Consider that:

- less than 5 percent of the world's small-scale hydropower potential has been exploited.
- the sun could produce at least 1 000 times more usable energy than humans need.
- land-based turbines could provide 20 000 terawatt hours of wind-powered electricity a year, twice as much as the world consumed between 1987 and 1988.
- more than 50 developing countries could produce as much energy from the residues of sugar production as they currently use from imported oil.

Renewable energy sources are becoming more viable as prices decrease and technologies become more efficient. But mountain dwellers need better access to credit, technology and information.

AN ANCIENT SOURCE OF POWER

For centuries, mountain people have been using water-power for milling and other agricultural tasks. With their steep slopes, high levels of precipitation and stores of water in the form of snow and ice, mountains can be major sources of hydropower. Today, hydropower provides 19 percent of the world's total electricity supply; more than 150 countries use it, and 50 countries rely on it for more than half of their electricity needs. But the promise of hydropower has yet to be tapped in much of the developing world. Many of the power-producing centres that exist in developing countries have failed to benefit mountain people because they were built to meet the needs of lowland populations. Also, in the past many dams, roads and reservoirs built for hydropower have scarred landscapes, deprived people of agricultural land, heightened the risk of landslides and flooding and forced mountain people to resettle. Today, people are increasingly aware that the building of large hydropower plants in mountain settings can have dire environmental and social consequences.

SMALL IS BEAUTIFUL

Small hydroelectric installations have great potential to promote economic development and self-reliance in mountain areas, without disrupting local cultures or the environment. Based on relatively simple technologies, micro-hydropower harnesses energy from streams and rivulets and converts it into electricity for local people to use in homes, irrigation and small-scale industry. Capacity ranges from a few kilowatts to tens of kilowatts.

Micro-hydropower is especially effective at supplying the energy needs of isolated, scattered upland communities. For example, at Salleri, a remote highland village in Nepal, a small hydropower system has strengthened the community by spawning thriving small enterprises that have halted migration to urban centres for employment. More international support for the promotion of micro-hydropower, along with financial assistance for start-up and training, would accelerate the use of this promising technology.

SUN, WIND AND HOT SPRINGS

The altitude and slope of mountains give them an advantage over lowland areas in the ability to produce solar energy, especially within 35 degrees of the Equator. This is because lower latitudes have more diffuse radiation and less cloud cover than higher latitudes. Also, snowy mountain peaks act as giant reflectors of solar energy, making it possible to capture reflected light. The most reliable technology uses photovoltaic cells to convert light into electricity. It uses no fuel and is noiseless and clean. Solar photovoltaic systems can be used to pump water for people and livestock, to generate power for electric fences and in communication.

Solar power is really taking off in mountain areas around the world. Lighting with solar systems has been successfully tried in many mountain regions. Solar cookers are widely used in the mountain areas of China and India. Solar space heating is used increasingly in the buildings of Tibet. In the highlands of Bolivia, where only 20 percent of households are connected to the national grid and fuelwood is scarce, solar systems in 2 000 homes are providing heat, light and cooking power. Almost all remote airport and telecommunication facilities in Nepal are powered by solar energy.

Wind power is currently growing at 30 percent a year and now represents the cheapest source of electricity in the United States of America. It has great potential in many mountain locations, and its successful use in Switzerland and Norway has proved it can be a viable source for some highland farming communities. In the Swiss Alps there are plans to use wind energy to power snow cannons in tourist areas in order to limit the damage inflicted on the environment by tourist infrastructure.

Geothermal power from the warm springs found in many mountain settings could be harnessed to heat space and water, but transporting this kind of power over long distances does pose challenges.

Many efforts to promote alternative energy sources fail because of high costs, difficulties in installation and use, and poor repair and maintenance services.

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