GOAL 7

Ensure access to affordable, reliable, sustainable & modern energy for all

Photo: UNDP Pakistan/Satomi Kato

SDG 7 is concerned both with enhancing people's access to energy for domestic, commercial and industrial uses, and with improving the sustainability and reducing the environmental footprint of energy generation and consumption.

How do ecosystems and biodiversity support this SDG?

Biodiversity and ecosystems make an important contribution to our global energy resources. The raw materials for fuel are often sourced from ecosystems, including wood, crop residues, livestock dung and biofuels. Ecosystems also offer a suite of regulating services which enable and sustain hydropower and wave power, while also acting as a carbon sink absorbing greenhouse gas emissions generated from the use of fossil fuels. The energy sector also impacts heavily on the natural environment. There are environmental risks associated with the over-abstraction of wood, conversion of natural habitats for the cultivation of biofuel crops, modification of natural landscapes and hydrological processes by hydropower developments, and the disruption of wave patterns and coastal accretion and erosion patterns by wave power generation infrastructure. If not carefully managed, these environmental pressures pose a risk to the economic viability of the energy sector.

How does UNDP's work **support** this SDG?

Case study: Protecting wetlands for renewable energy in Pakistan

The Protection and Management of Pakistan Wetlands Project ("the Pakistan Wetlands Project") aimed to enhance the conservation of 8,000 km^2 of wetlands in Pakistan that cover just under 10 percent of the total surface area of the country. This diverse assortment of natural freshwater and marine wetlands hosts unique, valuable and globally-significant biodiversity. Human pressures on wetland resources are however intense and increasing. Almost 150 million people reside permanently in wetland areas in Pakistan (many of whom are living well below the poverty line), including 3-4 million displaced persons from adjacent countries. This population depends heavily on wetland resources for their day-to-day subsistence and income. A wide range of products are used for food, fuel, medicines, grazing, construction and handicrafts. The most vulnerable population such as women, the poor, tribal and migrant communities have a particularly high reliance on wetland resources.

The heavy reliance of wetland-adjacent communities on wood-based sources of energy was identified as a particular threat to the natural environment, as well as a major constraint to local development. Riverine forests and woodlands were being rapidly felled to meet rural fuel needs, and community forests in particular had become seriously degraded. To reduce pressure on wetland ecosystems, but also as a means of strengthening the livelihoods of poor wetlands-adjacent communities, the project implemented a series of activities which introduced a range of low-technology, low-cost solutions for generating energy. These included wind power, household solar solutions, fuel efficient cook stoves and bio-gas and were carried out in four demonstration sites: Balochistan's Makran Coastal Wetlands Complex, the Central Indus Wetlands Complex (including Chashma Barrage Wildlife Sanctuary, Taunsa Barrage Wildlife Sanctuary, and Indus Dolphin Game Reserve), Salt Range Wetlands Complex (comprised of Lakes Kallar Kahar, Khabeki, Uchali, Jhalar, and Namal), and the Northern Alpine Wetlands Complex in the upper Yarkhun River Valley. The programme of work on renewable energy formed a part of community-level participatory management plans which were developed at each pilot site, alongside the implementation of activities to support and strengthen national policy, institutional, technical and financial frameworks that are required to sustainably manage wetlands and their associated biodiversity.

PROJECT: Protection and Management of Pakistan Wetlands Project

MAIN DONORS: GEF, UNDP, Royal Netherlands Embassy Pakistan, WWF Network, WWF Pakistan

LOCATION: Makran Coastal Wetlands Complex (Baluchistan Province), Central Indus Wetlands Complex (Punjab & Sindh Provinces), Salt Range Wetlands Complex (Punjab Province) and Northern Alpine Wetlands Complex (Khyber Pakhtunkhwa Province), feeding into national level, Pakistan

DATE: 2005-2012

WEBLINKS: http://www.pakistanwetlands.org/

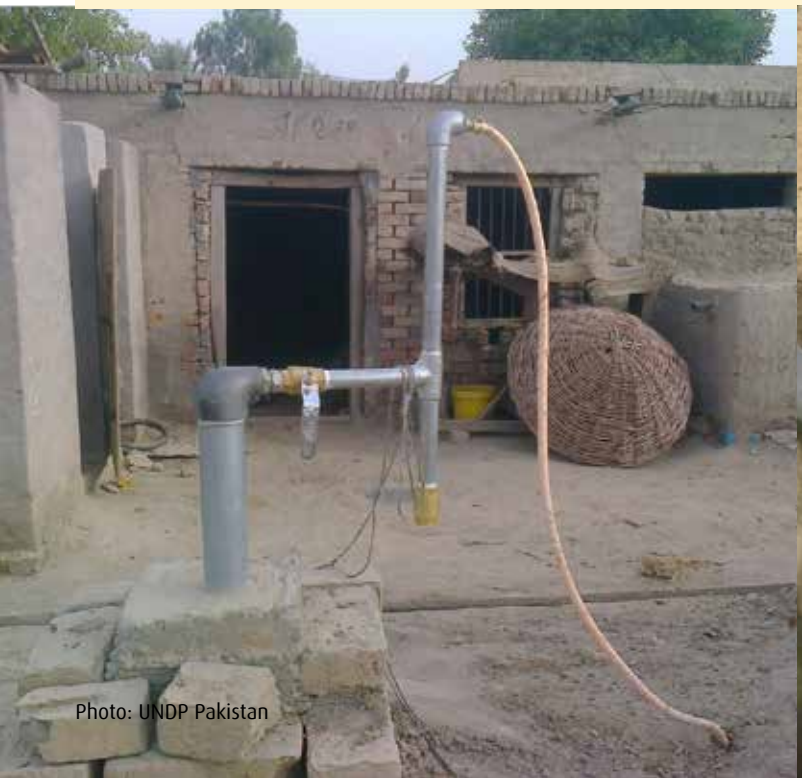

Photo: UNDP Pakistan

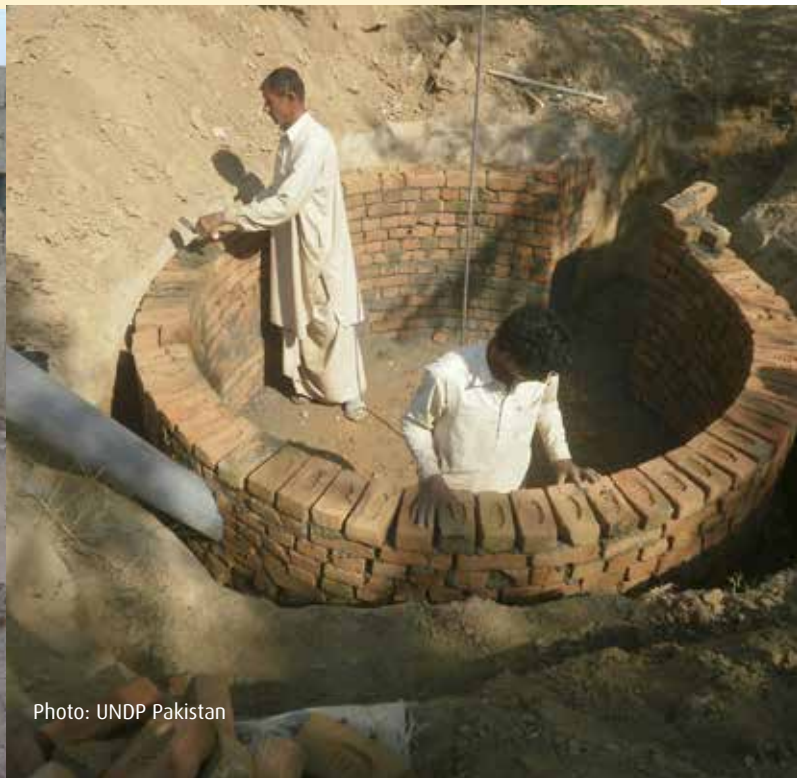

Photo: UNDP Pakistan

Nature count$: Key impacts of the project on access to energy

By supporting rural villagers in Pakistan to access cleaner, cheaper and more sustainable energy alternatives, the Pakistan Wetlands Project made a significant contribution to local livelihoods, helping reduce average annual household cash expenditure by a quarter, increase women's available labour time by a half, reduce fuelwood consumption by 50 percent, lower CO_2 emissions by 1.5 tonnes, and generate an additional US$500 or more in cash earnings and cost savings. As well as taking the pressure off local woodland and wetland resources, a shift away from firewood use also helped tackle significant health issues and associated costs. Indoor air pollution in Pakistan is estimated to cause 280,000 deaths and 40 million cases of acute respiratory illness a year, with costs in excess of $1.5 billion or 1 percent of GDP.

Clean, affordable, sustainable domestic energy alternatives

average costs, losses & damages avoided per household per year:
US$300 reduction in cash outlays (24% expenditures)
1,095 hours of labour time a year (50% of working year, US$200-312 earnings)
1.05 tonnes of fuelwood (50% of total consumption. US$225 value)
1.5 tonnes of CO_2 emissions

national health and economic problems associated with indoor air pollution:
>280,000 deaths, 40 million cases of acute respiratory illnesses a year, costing >US$1.5 billion or 1% of GDP

The project helped ensure universal access to affordable, reliable, and modern energy services (✓SDG Target 7.1), increase substantially the share of renewable energy (✓SDG Target 7.2), improve energy efficiency (✓SDG Target 7.3), promote investment in energy infrastructure and clean energy technologies (✓SDG Target 7.a) and expand infrastructure and upgrade technology for supplying modern and sustainable energy services (✓SDG Target 7.b).

How the economic impacts were calculated:

The project worked with wetland-adjacent villages to develop and operationalise a variety of clean, affordable and sustainable energy alternatives which would reduce or substitute household dependence on fuelwood, paying particular attention to the poorest and most vulnerable members of the community. These interventions strengthened biodiversity conservation and reduced threats to wetland ecosystems, at the same time as saving local residents considerable financial, economic and social costs, losses and damages.

Darran Village on the Makran coast of Baluchistan has a population of 200 people. In common with other areas of rural Pakistan, villagers lack electricity and gas supplies, and have no access to a nearby main road. The main source of domestic energy was kerosene, a costly and polluting fuel source which was difficult for the poorest households to access. The project worked to develop wind energy, as the village's coastal location offered ideal conditions for wind energy generation, providing a cost-effective solution to the local energy problem.

At a monthly charge of $0.14-0.28 (instead of the $21-28 that people were formerly spending on kerosene; Jamil and Hashmi 2009), this translated into average cash savings of almost $300 or 21,000 Pakistan Rupees (PKR) per household per year—as much as 24 percent of annual expenditures for the poorest quintile of the population (based on average monthly consumption expenditure figures for rural Baluchistan in 2008 given in PBS 2009). An additional benefit of bringing affordable, reliable electricity supplies to Darran has been that villagers can now use cell phones. These improved communications have greatly increased the flow of market information and business activity in the area.

Around 2,000 people live in the village of Bhet Gujji in Punjab Province. Although electricity was recently brought to the area, few people can yet afford or access it, and the majority of the population depend on firewood for domestic cooking and heating purposes. This places a huge strain on forests, which have become severely degraded. These pressures are particularly intense in the winter time when fuel demands are highest and movement is most difficult. The reduction in forest cover and quality has considerably increased the amount of time taken to collect fuelwood. This burden falls largely on women, who must travel far from their homes to supply domestic energy needs. Around three hours a day are typically spent collecting firewood (Jamil and Hashmi 2009). The project has helped the local community to install bio-gas plants which convert the manure from livestock into natural gas. This provides a cheap, clean and renewable source of energy that can be used for both cooking and lighting. Not only does this free up women's time for other productive activities, but it also generates valuable organic compost for crops as a by-product.

The average saving of 1,095 hours or 137 labour days per year per household translates into more than half of a working year, worth a minimum of $200-312 (PKR14,250-22,000) in potential earnings (based on the average daily wage rate for female rural agricultural workers of PKR160 a day in 2008 given in ODI 2014; and average daily wage rate of PKR104 a day for female informal sector employees given in Irfan 2008).

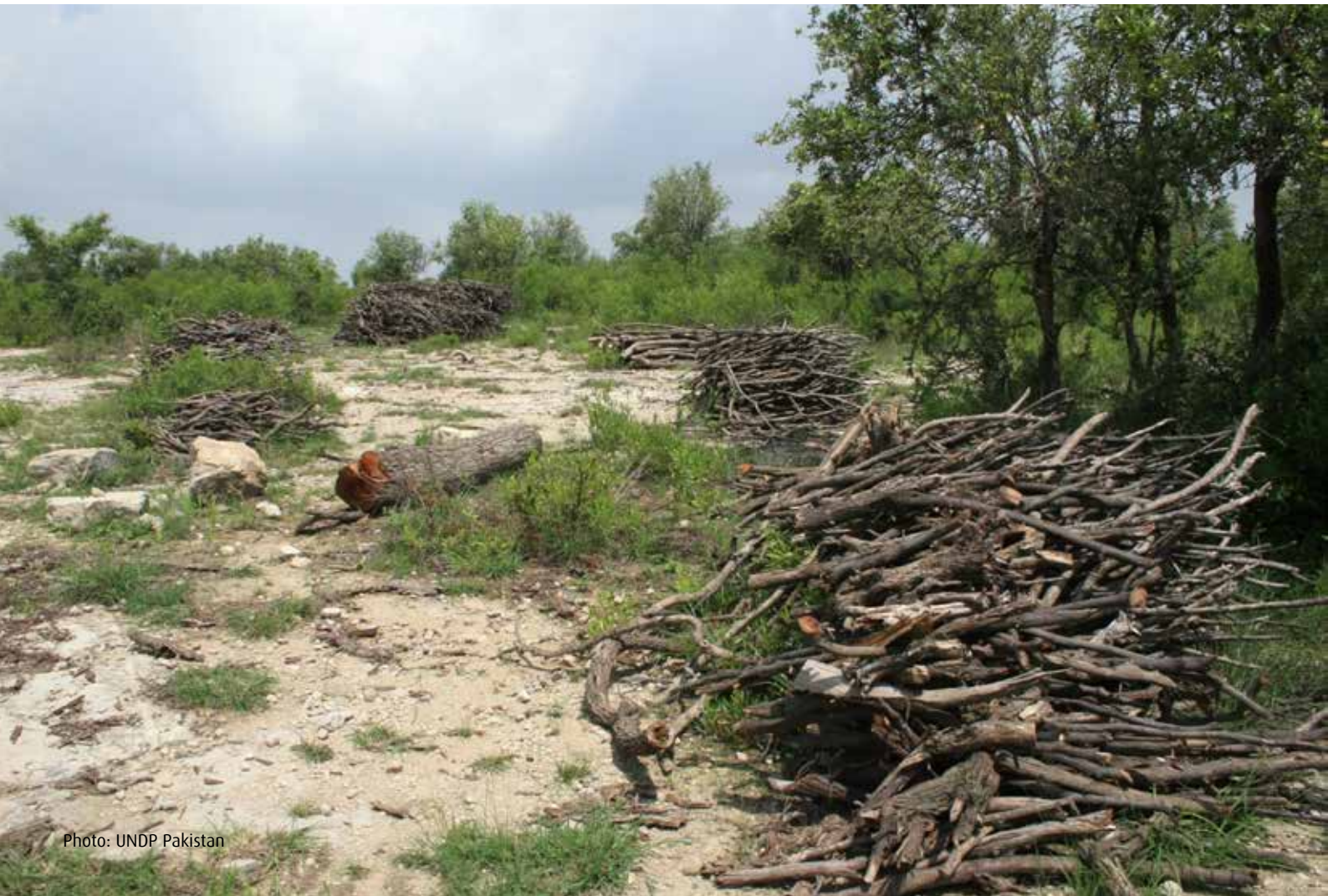

Photo: UNDP Pakistan

Hunjarai Village on the west bank of the Indus River in central Pakistan is located in a remote area 17 kilometres away from the nearest main road. Because there is no gas or electricity, almost all households depend on fuelwood as their primary source of energy. Food is cooked on traditional clay stoves which also provide a source of heat and light. Not only do these stoves require large amounts of firewood, but they emit large amounts of smoke. Many of the forests around Hunjarai have been cut down, meaning that women spend large amounts of time searching for fuelwood. The extensive use of fuelwood has resulted in an extremely high incidence of respiratory ailments among women and small children in the village. The project has trained villagers in the production and use of energy-efficient wood stoves. These are a modified version of the traditional design already found in the area, but are covered (thus reducing fuel consumption) and contain long exhaust pipes (which channel smoke outside the kitchen area, reducing health impacts).

Data collected from neighbouring areas of Punjab suggests that these types of energy-efficient cook stoves lead to an average reduction in fuelwood use of around 50 percent, from a baseline of around 2.1 tonnes per household per year (Haider 2002). At an average fuelwood price of PKR15 per kilogram, this is equivalent to $225 (PKR15,750) cash savings a year. Each tonne of fuelwood reduction has been estimated to save 1.5 tonnes of CO_2 emissions (AKPBS 2011). In addition, women have noticed less smoke in their homes and that house and cooking utensils stayed cleaner. There has been a significant decrease in lung infections, coughs and eye irritations reported in the village. Studies carried out in other parts of Pakistan have found that improved stoves can reduce median carbon monoxide concentrations by 44 percent and decrease particulate concentrations by more than 70 percent (AKPBS 2011). Improved stoves thus have the potential to considerably lessen the current health and economic problems associated with indoor air pollution, which is estimated to cause more than 280,000 deaths and around 40 million cases of acute respiratory illnesses a year (WHO 2007, World Bank 2006) and to incur health-related costs in excess of $1.5 billion or almost 1 percent of GDP (Fatmi et al. 2010).

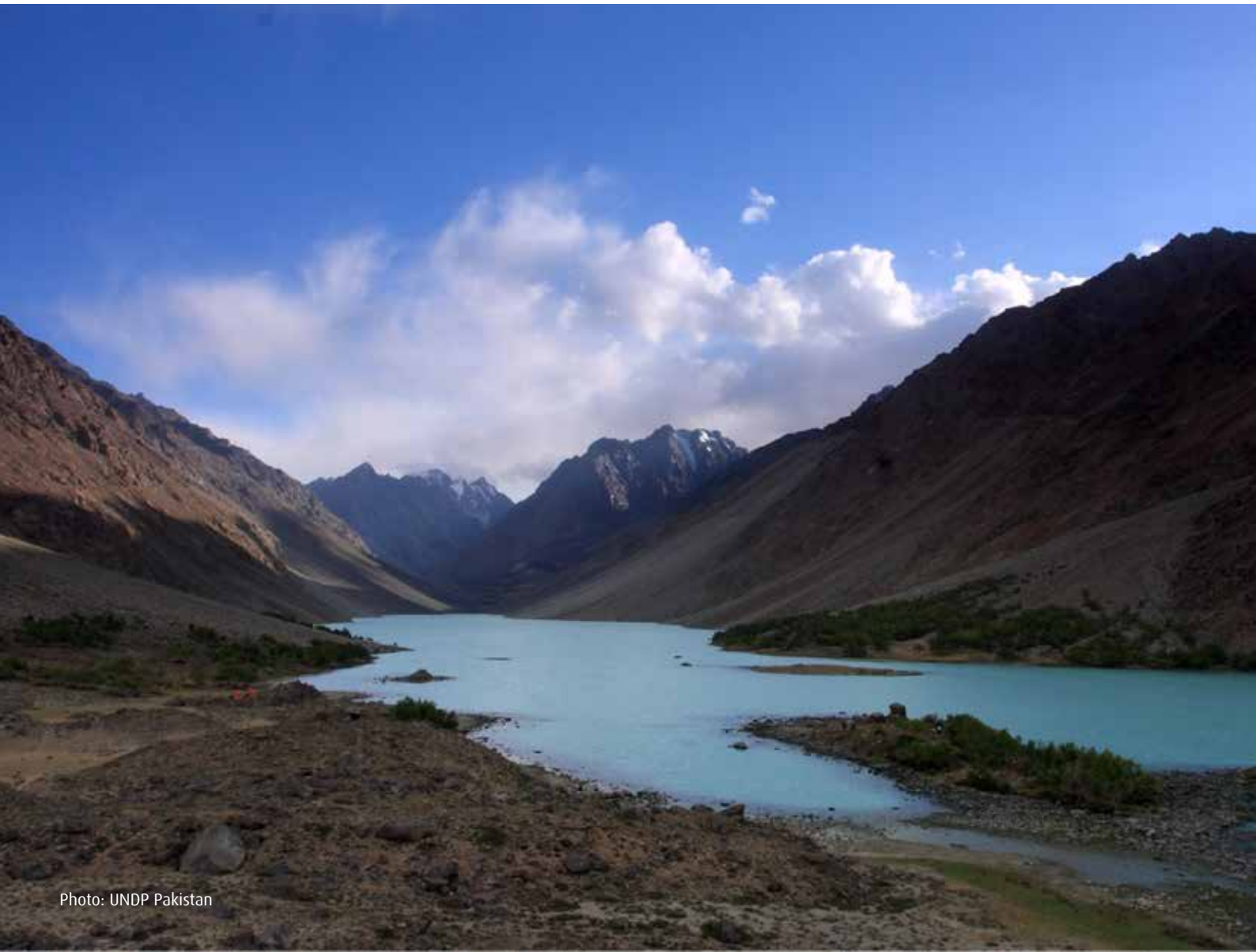

Photo: UNDP Pakistan

References

AKPBS. (2011) *Ashden Awards case study*. Gilgit, Building and Construction Improvement Programme, Aga Khan Planning and Building Service.

Fatmi, Z., Rahman, A., Kazi, A., Kadir, M. and Sathiakumar, N. (2010) Situational analysis of household energy and biomass use and associated health burden of indoor air pollution and mitigation efforts in Pakistan. *International Journal of Environmental Research and Public Health*. 7, 2940-2952.

Haider, M. (2002) *Success without subsidy: a case study of the fuel-efficient smokeless stoves project of the Escorts Foundation in Changa Manga District, Kasur*. Islamabad, UNDP Pakistan Country Office.

Irfan, M. (2008) *Pakistan's wage structure during 1990-91 – 2006/07*. Islamabad, Pakistan Institute of Development Economics, Quaid-i-Azam University.

Jamil, E. & Hashmi, Z. (2009) *Engaging communities: making environmental sustainability a reality in Pakistan*. Islamabad, UNDP Pakistan Country Office.

PBS. (2009) *Household Integrated Economic Survey (HIES) 2007-08*. Islamabad, Government of Pakistan Statistics Division, Pakistan Bureau of Statistics.

UNDP. (2006) *Project Document: Protection and management of Pakistan wetlands project*. Islamabad, UNDP Pakistan Country Office.

WHO. (2007) *Indoor air pollution: national burden of disease estimates*. Geneva, World Health Organization.

Wiggins, S. & Keats, S. (2014) *Rural wages in Asia*. London, Overseas Development Institute (ODI).

World Bank. (2006) *Pakistan Strategic Country Environment Assessment*. Washington, D.C., World Bank.

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