GOAL 6

Ensure availability and sustainable management of water and sanitation for all

Chishui Falls, Guizhou Province, China. Photo: Shutterstock/Jing Aiping

SDG 6 focuses on equitable access to clean and adequate water supplies and sanitation facilities. As well as aiming to improve the efficiency with which water is used and allocated, it has an explicit focus on supply-side measures including the restoration, protection and sustainable management of water-related ecosystems.

How do ecosystems and biodiversity conservation support this SDG?

Ecosystems help maintain water supplies, uphold water quality, and guard against water-related hazards and disasters. For example, wetlands play an appreciable role in surface, sub-surface and groundwater storage, as well as preserving dry season river flows and reducing the risk of flooding in wet seasons. They also serve to retain, process and dilute wastes and other pollutants, helping maintain water quality. Meanwhile, vegetation such as grasslands and forests offer a critical source of watershed protection in upland areas. They provide land cover which helps to slow the rate of runoff, guards against erosion, evens out seasonal peaks and troughs in water flow, and minimises silt and sediment loads carried downstream. These services typically have extremely high economic value for downstream water users, and help prolong the lifetime and productivity of water infrastructure such as reservoirs, supply facilities, irrigation schemes and hydropower dams. In addition, managing ecosystems to maintain these services is a more cost-effective option than employing artificial technologies or taking remedial measures when these essential functions have been lost or disrupted due to environmental degradation. For example, maintaining wetlands for flood control and mitigation is usually substantially cheaper than rebuilding roads, bridges and buildings that get washed away in flooding events. Conserving an upstream forest typically costs far less than investing in new water filtration and treatment plants downstream, or implementing expensive de-siltation activities in dams and reservoirs.

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

Case study: Payment for watershed services in the Chishui River Basin, China

The Chishui River is one of the most important tributaries of the upper Yangtze River. The river runs for 444 km through southwest China, and the river basin stretches over an area of almost 19,000 km^2 in Guizhou, Sichuan and Yunnan provinces. Environmental degradation has, however, been taking its toll. Deforestation and unsustainable farming practices in the steep slopes of the upper watershed have resulted in soil erosion, siltation, sedimentation and nutrient loading. Water quality has declined substantially, water shortages are becoming more common, and both the incidence and degree of damage from floods and landslides have increased. At present, almost 60 percent of the basin faces serious soil erosion, with 80,000 tons of sediment flowing into the Chishui River every year. Meanwhile, less than a third of domestic sewage is collected and a large proportion of agro-chemical runoff and industrial wastewater flows untreated into land and water. As the human population increases, farming and industrial development intensifies, and urban centres expand, the pressure on water resources has continued to escalate.

This project is working to develop and operationalise a payment scheme for watershed services, coupled with integrated watershed management that takes account of biodiversity and ecological function maintenance as well as development needs. Under the scheme, payments will be collected from major downstream water users and used as a source of finance and incentives for farmers that undertake sustainable land use practices and ecosystem conservation in the upper watershed. More than 80 percent of the population of the upper watershed depend on smallholder, largely subsistence-based, farming for their livelihoods. Almost half of the population falls below the poverty line and some 40 percent represent ethnic minority groups. The aim of the project is to enable and encourage land use change that will secure and sustain critical ecosystem services such as downstream water flow and quality, at the same time as conserving globally-significant biodiversity and improving livelihoods.

The project commenced in a demonstration site extending over 7,100 ha of the Wuma River sub-catchment. This targets a portion of the middle river basin that has been heavily impacted by environmental degradation and its associated impacts on water resources. The Wuma discharges into the Chishui River just

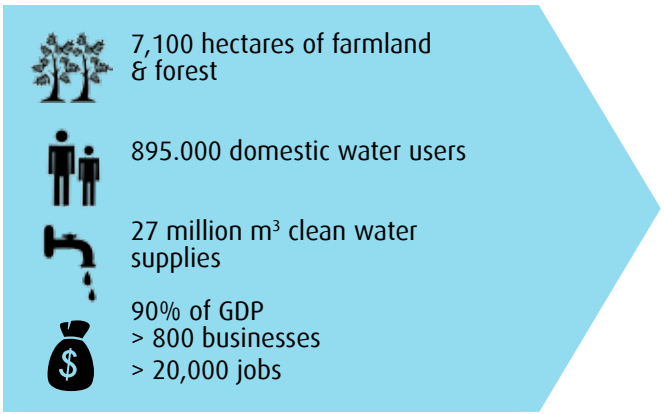
Factory on the Chishui River. Photo: UNDP China

13 km upstream of the main water intake for Renhuai City's industrial park. The local economy depends largely on the beverage industry, which requires a continuous supply of clean water for the production process. In addition, the livelihoods of residents in the urban and the rural areas of this region depend on the river. Once demonstrated, this scheme will be scaled up across the 11,800km^2 watershed area of other Chishui tributary catchments in Guizhou Province (which comprises just over 60 percent of the total watershed area) and subsequently to the entire 19,000 km^2 of the Chishui River Basin.

PROJECT: Payment for Watershed Services in the Chishui River Basin for the Conservation of Globally Significant Biodiversity
FUNDED BY: GEF, UNDP, Government of China
LOCATION: Guizhou Province, feeding into Sichuan and Yunnan Provinces, national-level China
DATE: 2014-2018
WEBLINKS: https://www.thegef.org/gef/project_detail?projID=5096

Nature count$: Key impacts of the project on water availability

By incentivizing sustainable land management across a 7,100 ha demonstration site in the upper Wuma sub-catchment, China, the project is helping to secure more than 27 million m^3 of clean and regular domestic water supplies a year for 895,000 people. It is also supporting the earnings of more than 800 businesses, upholding the jobs of 20,000 workers, and safeguarding more than 90 percent of regional GDP. These pilot activities are expected to have substantial multiplier effects. More than 10 million water users in 800 towns and villages will benefit as payments for watershed services are scaled up across the Chishui River Basin, helping avoid more than US$437 million of damages, costs and losses each year.



This project is helping to achieve universal and equitable access to safe and affordable drinking water for all (✓SDG Target 6.1) as well as leading to improvements in water quality by reducing pollution (✓SDG Target 6.3) and reductions in water scarcity (✓SDG Target 6.4), at the same time as operationalising integrated water resources management approaches (✓SDG Target 6.5) and protecting and restoring water-related ecosystems (✓SDG Target 6.6), carried out in a manner which supports and strengthens the participation of local communities (✓SDG Target 6.b).

How the economic impacts were calculated:

As detailed in the project document, a pilot area of at least 7,100 ha of forest and agricultural land in the Wuma sub-catchment will initially be put under sustainable land management (UNDP 2014b). The beneficiaries of the demonstration activities will comprise three main groups: downstream domestic water

users and beverage manufacturers who both gain better access to clean and regular water supplies, and poor upland farmers who will secure a new source of income through payments for watershed services.

Downstream domestic water users include 740,000 people living in Renhuai county-level city and 155,000 people in the Wuma sub-catchment (UNDP 2014a, updated using population projections from NBS 2016). Statistics for Zunyi (the prefecture-level city within which the downstream areas are located) indicate that 18 percent of the population is urban (from EIU 2012, NBS 2016), translating into some 161,100 urban and 733,900 rural water users. While average per capita domestic water use in Guizhou Province was recorded as 271.92 litres per year in 2014 (NBS 2016), demand is much higher in cities than in the countryside. In the Yangtze Basin, per capita domestic water consumption has been calculated to be 57 litres per day in rural areas and 207 litres in urban areas (Amarasinghe et al, 2005). Applying these figures gives an estimate of more than 27 million m^3 of domestic water would benefit from sustainable land management activities in the Wuma sub-catchment.

The beverage manufacturing industry is a key commercial beneficiary of the demonstration activities. Around 800 beverage enterprises are currently recorded to be operating in Renhuai City (Jia'e Wang 2015), employing over 20,000 people and supporting the cultivation of more than 13,000 ha of organic sorghum by farmers in 158 villages (Raimedhi 2015). In 2014, beverage industry accounted for more than 90 percent of Renhuai's industrial value-added output, generating $3.6 billion or 22.4 billion Chinese Yuan (CNY) (Raimedhi 2015).

The demonstration site activities also benefit the poor upland farmers in Xienong and Sanyuan villages in Wuma township, who receive income from payments for watershed services. Income is expected to increase by 10 percent a year as a result of the introduction of these payments (UNDP 2012b). It is worth noting that these farmers represent a particularly economically-marginalized and vulnerable sector of the population. Around half of the farmers in the upper watershed fall below the poverty line and around 40 percent belong to ethnic minority groups (UNDP 2014b). Guizhou is the poorest of China's 34 provinces, and the Wuma and Chishui upper watersheds are some of the poorest areas of the province. Gross Regional Product (GRP) per capita in Guizhou in 2014 was just $4,290 or CNY26,437, as compared to a national average GDP of $7,590 or CNY46,629 (NBS 2016). In Zunyi City, income figures were even lower at $3,900 or CNY25,852 (China Knowledge Online 2016), falling as far as $218 or CNY1,351 in the upper reaches of the Wuma sub-watershed (WWF 2012b).

Ultimately, through these demonstration activities, the project aims to leverage payment for watershed services schemes, which will result in sustainable land management across the entire Chishui River Basin of 1,893,200 ha. The beneficiaries of these scaled-up activities are the approximately 10 million people in more than 800 towns and villages whose access to clean and regular water supplies will be safeguarded (UNDP 2014b).

The target areas for sustainable land management and payment for watershed services are assumed to comprise the forests and farmlands that are located in environmentally-sensitive watershed areas. In total, some 57 percent of the basin or 1.08 million ha are identified as being prone to soil erosion (UNDP 2014b). Forest cover is currently estimated at 21 percent in the upper watershed (UNDP 2014b), a figure which is assumed to increase by 10 percent (the same rate that is being achieved in the demonstration site). This translates to just over 334,500 ha of forest conserved in erosion-prone areas of the river basin. The sustainability of agricultural land use practices is expected to greatly improve on the 43 percent of cultivated land that is located on slopes over 25° within farms that occupy around a third of the basin (UNDP 2014b), covering 162,400 ha in erosion-prone areas of the basin.

The value of protecting ecosystem/watershed services can be calculated by looking at the costs, losses and damages avoided as a result of conservation and sustainable land management (comprising, for example, private and public expenditures on additional water treatment and purification, expenditures on alternative water sources in dry season and droughts, production losses due to water shortage and loss of

quality, damages to infrastructure and assets due to flooding and landslides). Studies carried out in other parts of China and neighbouring Mekong countries with a similar socio-economic and ecological profile to the Chishui River Basin suggest that these values average some US$880/ha/year (ADB 2010, Emerton and Yan Min Aung 2013, Emerton et al. 2014, Hansen and Top 2006, Jia and Emerton 2012, Nabangchang 2010, Rosales et al. 2005, Sude et al. 2011, Wu Shuirong et al. 2009, Wu et al. 2010, Zhang Biao et al. 2010, Zhongwei Guo at al. 2001, updated to current prices and converted to China purchasing power parity equivalents using IMF 2016). For the just under 5,000 km^2 of degraded watershed ecosystems that are expected to be under sustainable land management in the Chishui River Basin, this translates into the avoidance of additional water conservation-related costs worth some $437 million or CNY2.87 billion a year.

Chishui Falls, Guizhou Province, China. Photo: Shutterstock/Jing Aiping

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This Key Sheet is part of the *Nature Count$: Investing in Ecosystems and Biodiversity for Sustainable Development* publication. View the full publication (booklet and key sheet series) at
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