LOWER KARNALI WATERSHED HEALTH REPORT

Community Vision - "Equitable Lower Karnali Watershed with natural resources, biodiversity conservation & sustainable use"

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What is a watershed?

A watershed is an area of land that contains a common set of streams and rivers that drain into a single larger body of water, such as a river (Figure 1). However, watersheds include more than streams and rivers; they also consist of all the people, forests, wildlife, villages, infrastructure, terrain, climate, and agriculture within the landscape.

It is important to think about a watershed in its entirety – upstream and downstream – instead of only looking at one element of the watershed. This is because water flows and connects various aspects of a watershed. What happens upstream has an impact on what happens downstream. For example, gravel mining upstream can increase sedimentation for downstream residents. Similarly, water diversions upstream for irrigation can reduce the amount of water available downstream for people and aquatic species.

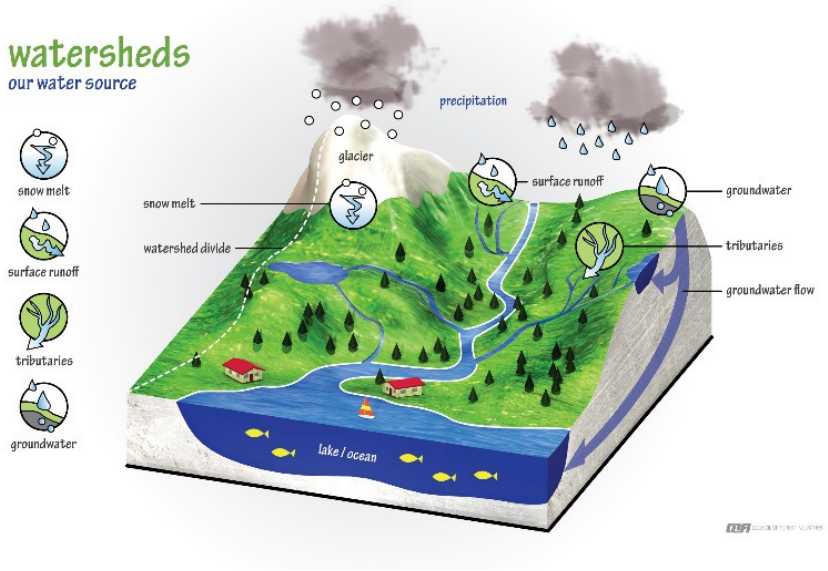

Figure 1: Diagram of a typical watershed

The goal of this watershed health assessment is to help people living in the Lower Karnali watershed make better decisions, protect and restore the watershed, reduce risks, and create sustainable economic opportunities.

This watershed report uses indicators to measure different aspects of a watershed to determine if the landscape is healthy and able to provide ecosystem services to people living in that watershed. The indicators in this report were determined through a combination of local stakeholder use priorities and watershed health as defined in the literature.

The health indicators in this report are grouped under larger categories of 1) nature, 2) wealth and 3) power, each of which explores related aspects of the watershed from that particular viewpoint. A full profile of the Lower Karnali watershed has also been prepared.

River Basin	Lower Karnali
Provinces	Numbers 5 and 6
Total drainage area	875.32 km^2
Number of streams	59
Major rivers	Karnali, Geruwa, Aaurahi
Lakes and wetlands	Tara, Bahraiya, Bhagaraiya, Babai, Orahi
Land use	Forest, 55%; agricultural land, 34%; rivers and streams, 9%; grazing land, 2%
Municipalities	Geruwa Rural Municipality, Rajapur, Thakurbaba, Madhuwan Municipality, Tikapur Municipality, Janaki and Mohanyal Rural Municipality, Panchapuri and Barahatal Rural Municipality.
Population	171,943 (48% male; 52% female) (CBS, 2015)
Ethnic groups	Brahmin and Chhetri 26%; Janajati 61% (Tharu 89%); Dalit 8%; Others, 5%

The Karnali River, the longest in Nepal, is a perennial, turbulent and free flowing river of the Himalaya. It originates north of Nepal in China at Lakes Mansarovar and Rakas and takes in many snow-fed rivers on its way south through Mugu and Humla. Near Chisapani, in the south of Nepal, the Karnali carves a spectacular gorge known for its diversity of trans-Himalayan and sub-Himalayan fish species. In all, 74 species of fish have been found in the Karnali, making it a valuable biodiversity hotspot (Shrestha, 1990).

The bottom of the Karnali River is strewn with boulders in the northern reaches, but turns sandy in the south. Due to its sharp descent and the fragile geology in which it is embedded, the Karnali carries a high sediment load. Downstream from Chisapani, the Karnali splits into two channels: Geruwa to the west and Karnali to the right. The Karnali ranges in depth along its course between 10-100 meters and the average discharge, measured at Chisapani, is 17,151 m^3/s.

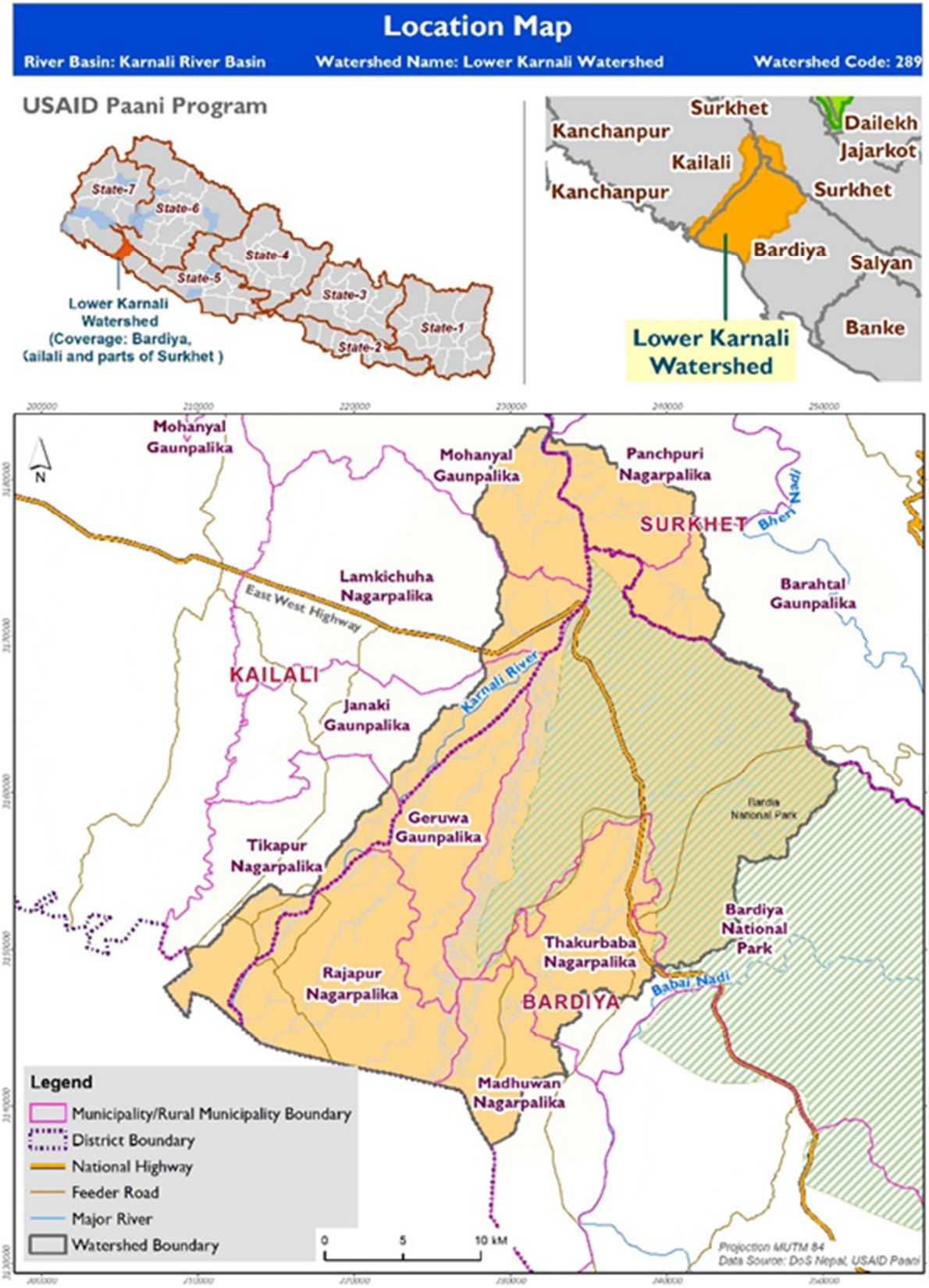

Figure 2: Location Map of Lower Karnali Watershed

The Lower Karnali watershed stretches across parts of 10 municipalities in Bardiya, Kailali and Surkhet districts, including a protected area – Bardiya National Park (Figure 2). The watershed has a sub-tropical monsoon climate with three distinct seasons: hot and dry in pre-monsoon (February to mid-June), hot and wet during monsoon (mid-June to late Sept.) and cool and dry in post-monsoon (late Sept. to Feb).

Priority issues in the Lower Karnali watershed are drought, gravel mining, floods and inundation, degradation of aquatic habitats, and maintenance of traditional livelihoods (Figure 3).

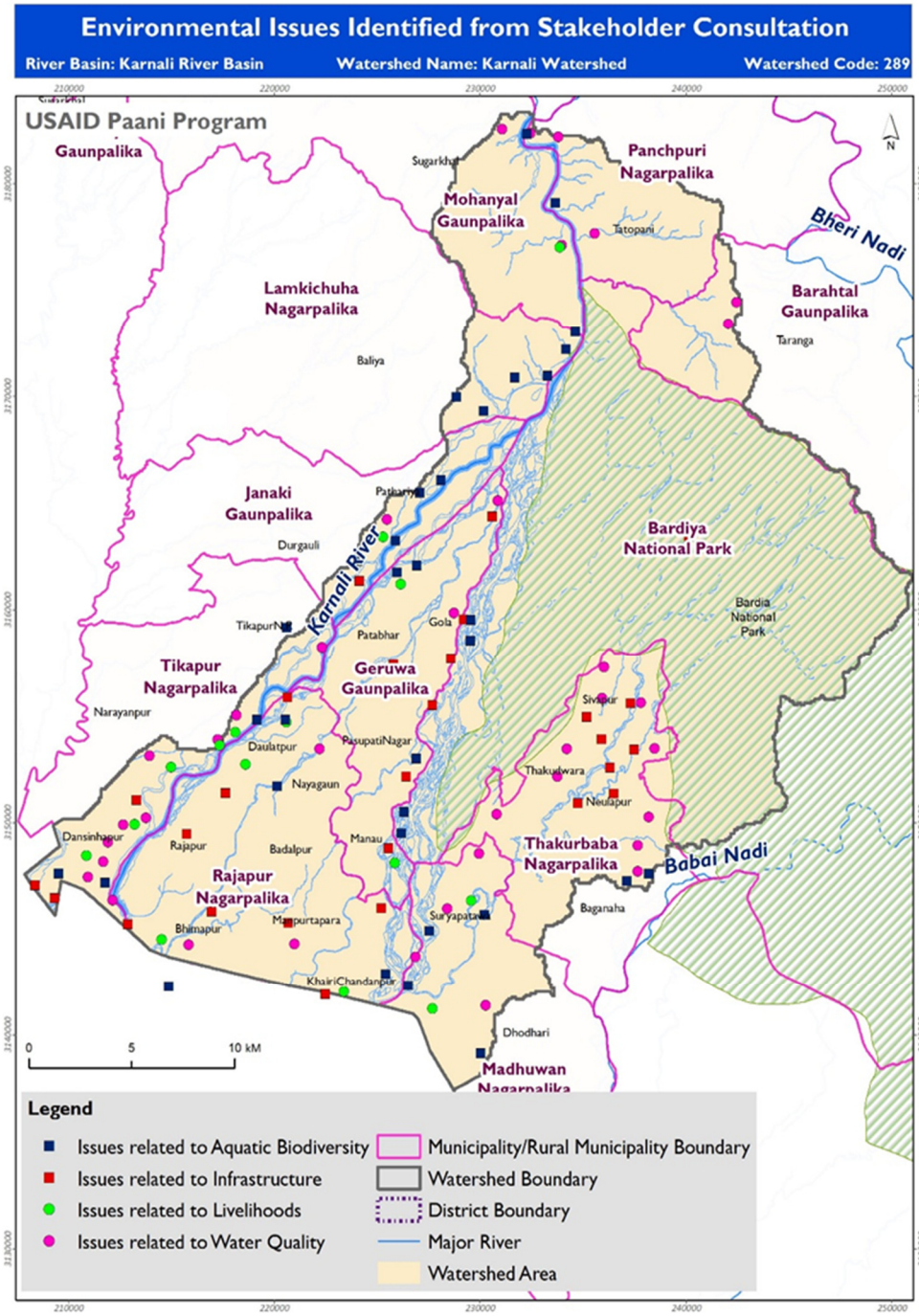

Figure 3: Map of Lower Karnali watershed including priority issues by location

Nature

Health indicators in this section include various aspects of the watershed ecosystem, including water, biodiversity and land use.

Water

Water is key to supporting ecosystems, including human and ecological communities. In Lower Karnali watershed, the major sources of water include rainfall, temperature, sunshine, glacier melt, infiltration, and withdrawals for human use among other factors.

Rainfall

There are two meteorological stations in the Lower Karnali watershed: at Chisapani (405) and Rajapur (411), which lie in the northern and southern parts of the watershed, respectively. Meteorological stations outside the watersheds are Tikapur (207), Bargadha (415), Rani Jaruwa Nursery (417) and Jamu (403).

The watershed receives approximately 90% of its annual rainfall during the monsoon (July-Sept). Annual rainfall amounts range from 1,400 mm/year at Gularia to 2,000 mm/year at Chisapani. The average dry season rainfall (Nov-May) is 193 mm, while monsoon rainfall averages 1,600 mm. Cold waves in winter season bring cloud cover that last 4-5 weeks.

Water availability and accessibility

There are 58 small and medium size streams and rivers in Lower Karnali watershed. The total length of rivers combined is 449 km. and they cover 78.4 km^2.

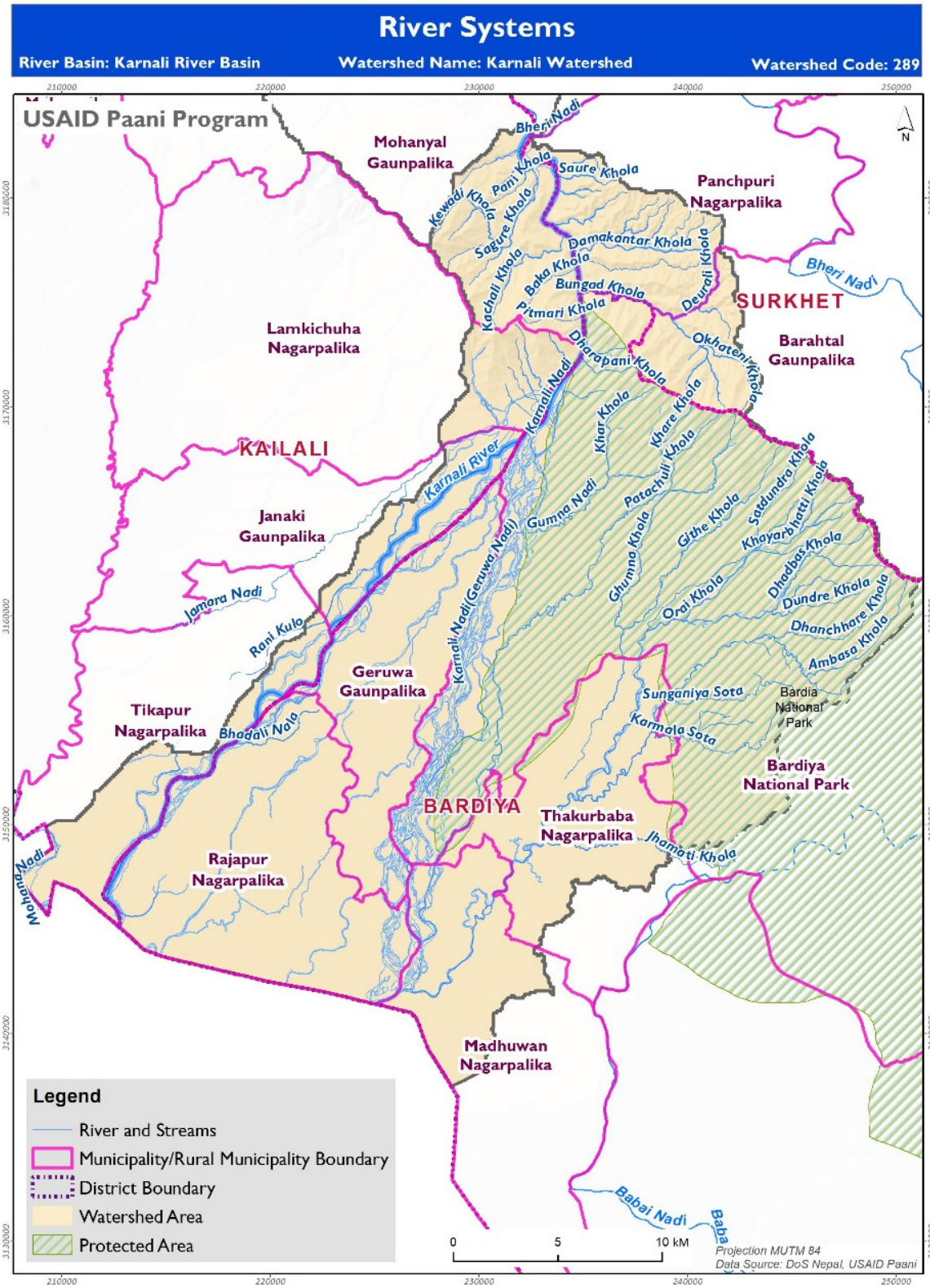

Figure 4: Rivers and streams in the Lower Karnali watershed

Ground water is the main source of drinking water. In Paani's 2017 survey, conducted by FEDWASUN, 57% of households reported using water extracted from tube wells (Figure 5). Water scarcity is an enduring concern in the watershed. Of those 56% who reported that their water sources have been drying, 83% faced difficulties in obtaining water due to drying water sources. Five percent said they spent more than 30 minutes per day obtaining water for daily needs.

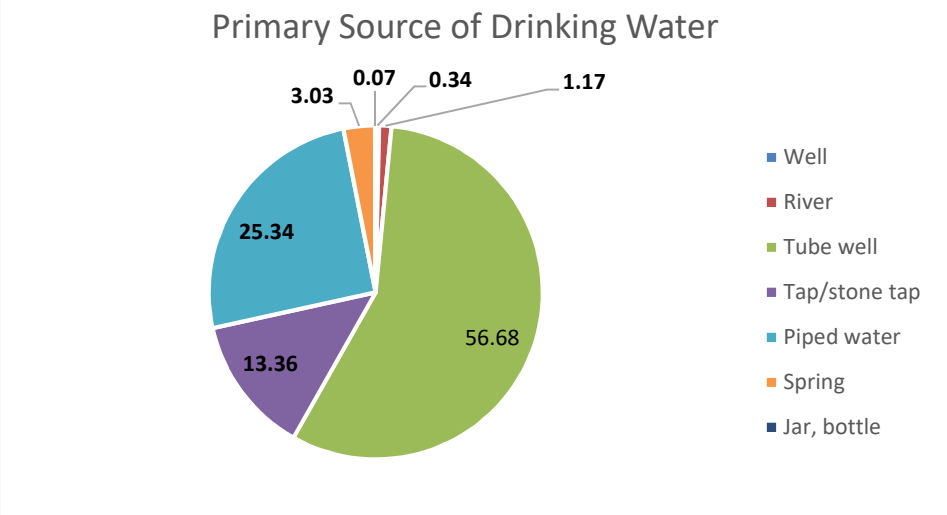

Figure 5: Household water sources by percentage (Paani household survey, 2017)

Water accessibility, on the other hand, indicates the degree of ease for users to obtain water. Obstacles to water accessibility can be physical (e.g., distance to water points) or cultural (e.g., water sources available only to certain castes), or both. This is not a large concern in Lower Karnali: 89.5% of households said they have equal access to drinking water.

95%

Households fetch water within half hour distance

River and lake water quality

Due to growing urbanization and poorly managed solid and other household wastes, water pollution has been increasing in the watershed. Non-point sources of pollution include agro-chemicals, plastics, raw sewage, and dead animal disposal. Furthermore, local residents reported that the Geruwa River becomes almost stagnant during winter because of raised beds in the upper parts of the river. These decreased flows affect aquatic habitats, including that of the rare Gangetic Dolphin.

Water quality monitoring conducted at the selected river sites in Lower Karnali watershed during monsoon season (July 2017, 13 sites) and winter season (January 2018, 22 sites). Water samples were collected and tested for Conductivity, Temperature, Iron, pH, Nitrate and Nitrite Nitrogen, Ammonium, Phosphate, Dissolved Oxygen and Turbidity. Generally, water quality in the Lower Karnali watershed falls within accepted ranges for drinking, agriculture, irrigation, and aquatic life. Levels of Ammonium were slightly elevated in few sites (max of 4 mg/l) and Phosphate were elevated in majority of the sites (max of 20.5 mg/l).

The majority of perceptions of water quality were positive. Fifty-five percent of respondents perceived that the water quality was either good, fair or excellent, compared to 30% who perceived as bad.

Among those who perceived water quality as bad, a significantly higher proportion (26%) had diarrhea in the past three months compared to 10% who perceived water quality as either good, excellent or fair. Only 20% of households reported that they purify water before drinking.

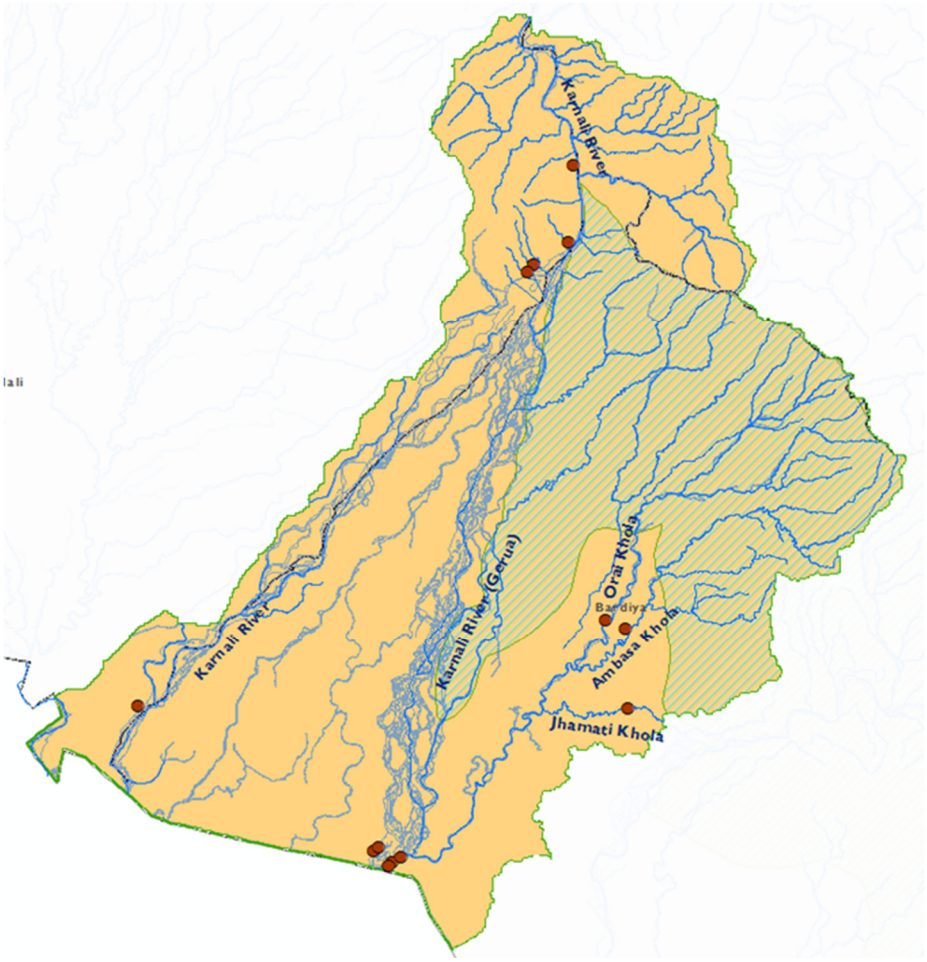

Figure 6: Water testing points in the Lower Karnali watershed

Biodiversity and habitat

Biodiversity and habitat speak to the overall environmental strength of an area to support a wide range of animal and plant species and human uses, such as fishing or agriculture.

Land use and land cover

More than half the land in Lower Karnali (55%) is forest cover, and 34% is cultivated for agriculture. Rivers and streams cover 9%, while only 2% is grazing land for livestock. Of the total forestland (482 km^2), 69% sits within Bardiya National Park, a protected area. Residents said that lakes and rivers appears to be shrinking, and in the case of rivers, drying up at certain points of the year. This variability in water affects fish diversity and populations.

Using time-lapse data from Global Forest Watch, we find that the total area of forest cover from 2000-2016 was a net gain 2% due to reforestation efforts but a 9% loss due to erosion and human activity,

particularly along East-West highway and the banks of the Karnali and Geruwa River including the area under National Park (Figure 7).

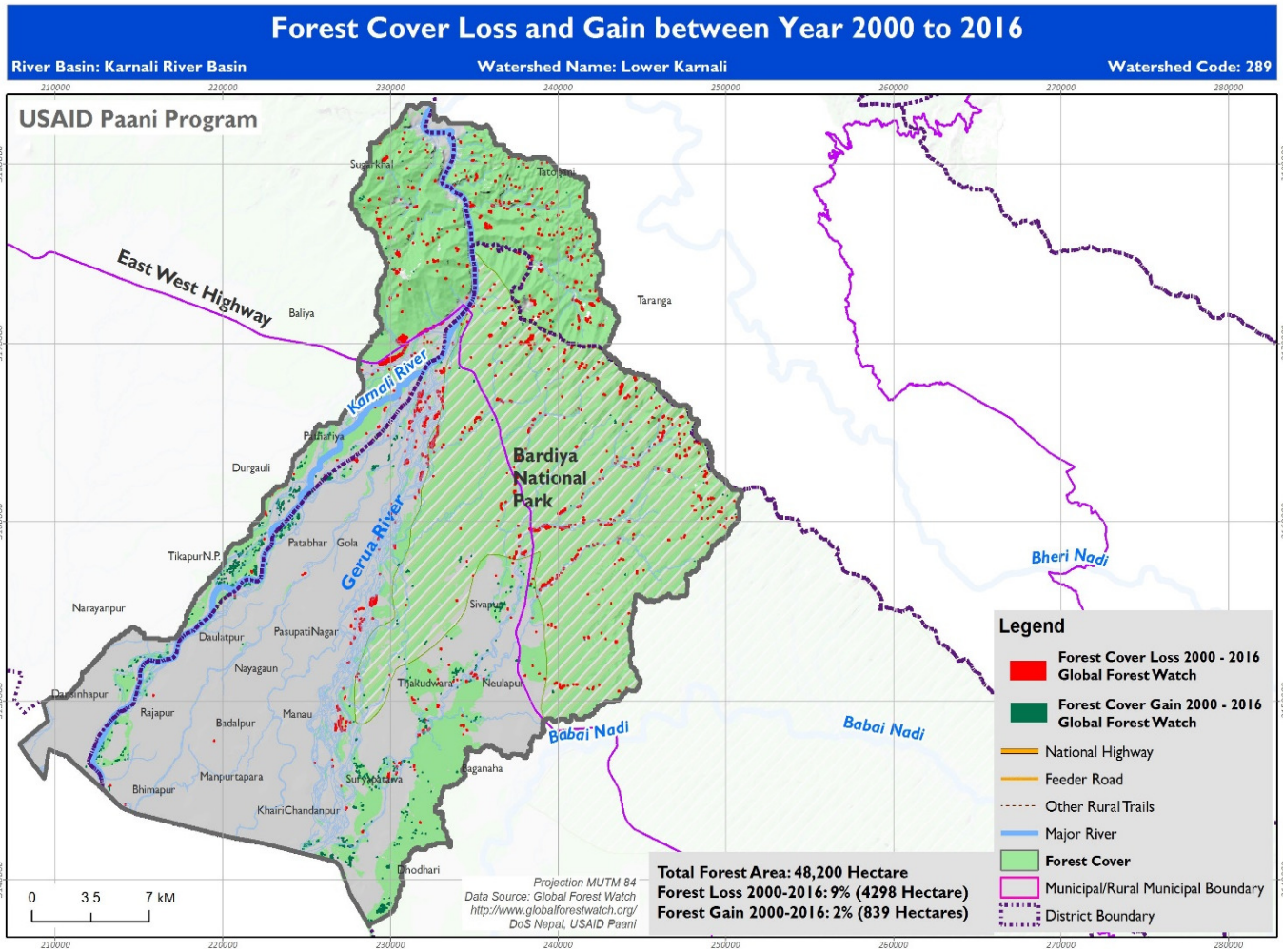

Figure 7: Forest cover gain and loss in Lower Karnali Watershed (2000-2016)

Fish diversity

The Lower Karnali watershed provides important habitats for many species of fish, including several of native origin: *Sahar (*Golden Mahaseer*), Rawa, Thed, Kathlaggi, Rajbaam,* and *Karauwa,* among others. The *Mohi* was thought to be extinct in the 1990s, but community consultation reported that its population has rebounded. The *Asala* (Himalayan trout), by contrast, was available in the watershed until 2007 in Bardiya National Park. Today, it cannot be found in the area. Of the households surveyed, 69% said they believed native fish populations in the watershed to have declined.

69%

Respondent opined that native fish population decreased

Wealth

Indicators in this category refer to the current economic conditions within the watershed as well as future prospects. In this section, we focus on the most prominent forms of eco-tourism linked to good governance of famer managed irrigation systems, hotels and restaurants, dolphin conservation and rafting industries, and wildlife conservation and livelihood in the Lower Karnali watershed.

Agriculture is the primary livelihood activity (for 54% of households surveyed), and farmers earn most of their take home pay through staple crops. This is followed by daily wages (25%), livestock (4%), and capture fisheries (3%).

A baseline study carried out by the Hariyo Ban Program (2012) shows that the average income of Bardiya District is NPR 105,391 (Figure 8). The main sources of household income are agriculture, employment, livestock and remittance. According to the baseline report, agriculture shares 38% household income followed by employment (32%), remittance (14%), other (9%) and livestock (7%). The crops in this watershed are rice, wheat, maize, lentil, mustard, gram and vegetables (Figure 9).

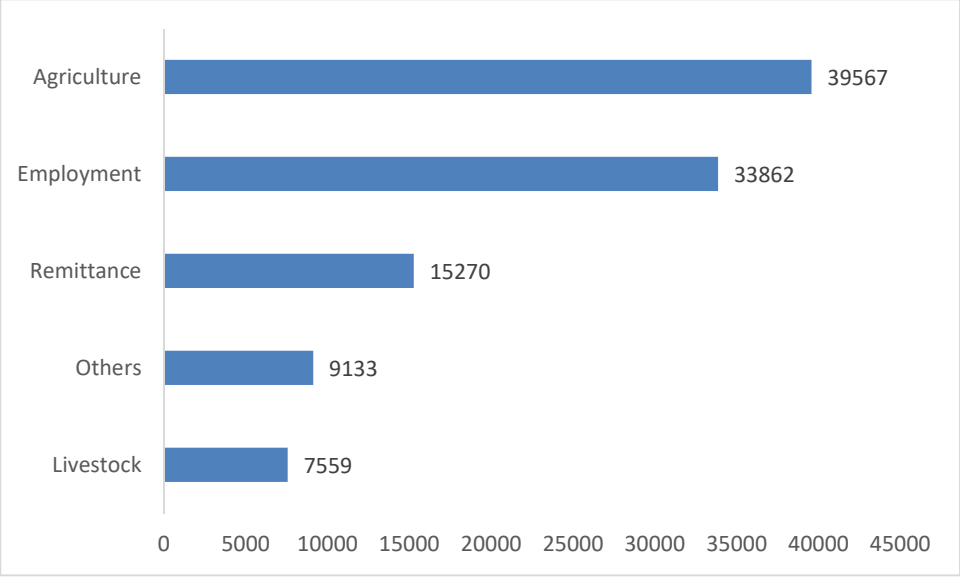

Figure 8: Average income of Bardiya District (Hariyo Ban Baseline Survey, 2012)

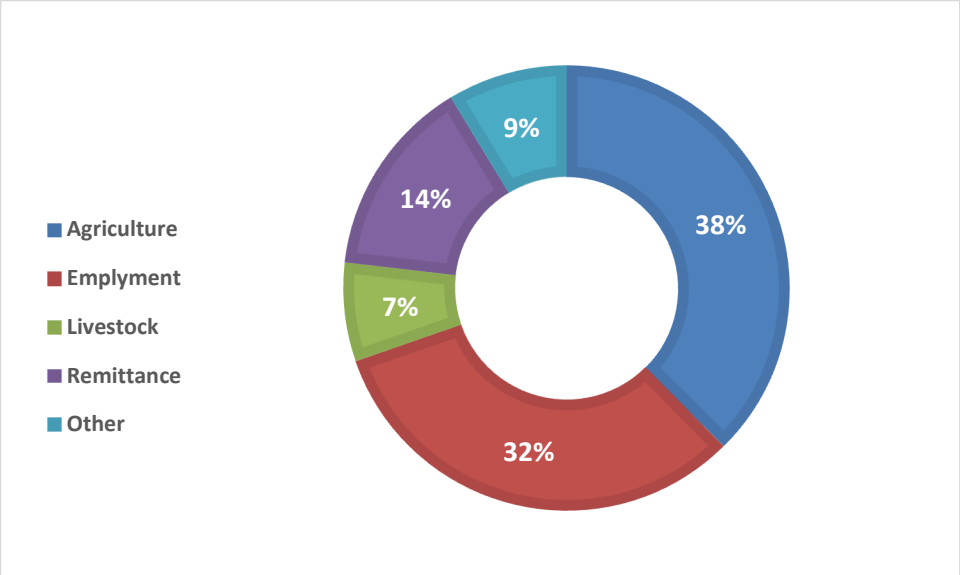

Figure 9: Percentage of income earned per livelihood (Hariyo Ban Baseline Survey, 2012)

Infrastructure and extractives

The design and construction of infrastructure, such as roads and hydropower plants, has an impact on the health of the watershed. For example, poorly designed rural roads on steep slopes can greatly increase soil erosion and landslides. Similarly, hydropower plants that divert or impound water will restrict the amount of water available for aquatic life that people depend on for their livelihoods. Irrigation canals, while bringing benefits to one group of farmers, can also reduce the amount of water available to other farmer populations. As demonstrated by these examples, it is important that the design, construction and operation of infrastructure projects account for the full range of social, economic, and environmental within the watershed. Sustainable infrastructure should provide equitable distribution of benefits with minimal long-term, environmental impacts.

Capture fishery practices

Fishing in Lower Karnali is carried out using both traditional and non-traditional practices (Figure 10). The dominant traditional fishing practices include net casting, gill nets, traditional fish trapping methods, fishing hooks, draining water, and trapping fish in paddy fields. In recent years, non-traditional forms of fishing have appeared on the river, many of them destructive and harmful to aquatic habitats (e.g., poison, electric current). However, although some of these non-traditional practices are not technically illegal, anti-poaching campaigns and community groups have been largely successful in removing them from the watershed.

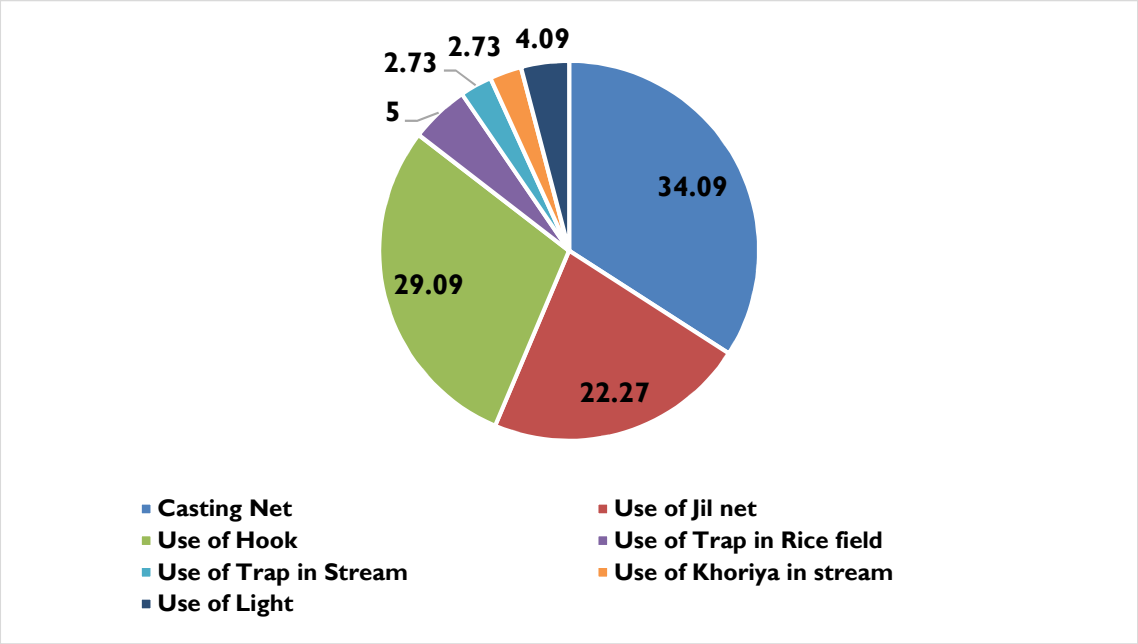

Figure 10: Fishing methods employed by household in the Lower Karnali watershed

Gravel mining

In the last five years, gravel mining has increased sharply in the Lower Karnali watershed. In 2012, the annual revenue from mining was between 200-250 thousand Nepali rupees. In 2017, that figure was 48 million – or an increase of approximately 19,000%. The District Coordination Committee (DCC) issues licenses to private interests for riverbed mining and boulder extraction. Existing environmental impact assessments (EIA) are available but the recommendations are rarely implemented and enforced. Furthermore, municipalities lack the capacity to provide proper monitoring and oversight of mining operations. Residents say the revenue collected by local governments have not been reallocated for community welfare or watershed conservation.

Roads

Two strategic roads (the Postal highway and East-West highway) run east to west through the Lower Karnali watershed. The elevated roadbeds of these highways interrupt water flow and restrict the amount of water reaching downstream areas. They also have a dam-like effect, which causes water to pond and inundate some locations upstream of the highways. All of these features impact aquatic habitats, migration pathways, and breeding areas of many species, including the Gangetic Dolphin and Golden Mahaseer. A fuller illustration of the road network in the watershed is featured in Figure 11.

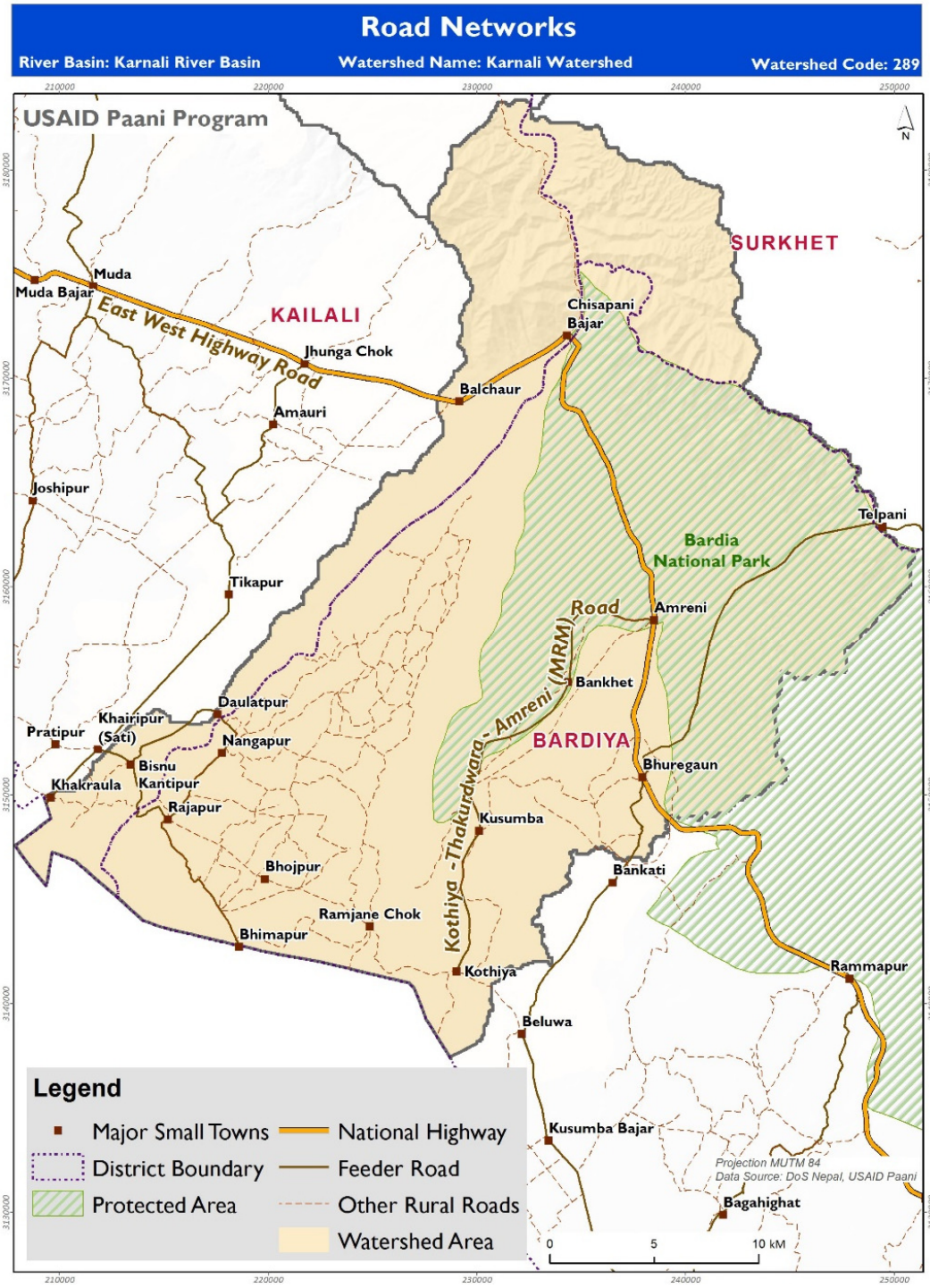

Figure 11: Road networks in the Lower Karnali watershed

Irrigation

Analyzing irrigation systems helps evaluate water availability, potential impacts on river systems, and the status of aquatic life in different water bodies. The extent to which water is diverted for irrigation

directly affects local aquatic life. In other words, river systems need to maintain a base environmental flow to keep aquatic life supported and intact.

The farmer managed irrigation system (FMIS) in Lower Karnali is renowned for its success in providing water to farmers and families throughout the year. Sponsored by the World Bank and Asian Development Bank, the irrigation scheme is actually four FMIS (three in Kailali and one in Bardiya) that work together. The system draws water from the Karnali River and has proven reliable in providing water year round; however, frequent maintenance at the head of the system is required.

The success of this system has helped to spawn a large and sophisticated administrative system to oversee its operation. Fifty-seven *maujas* (community irrigation groups) manage irrigation that covers more than 6,000 hectares. The *maujas* are not only responsible for hardware of the irrigation system, but also for dispute resolution and development activities within their boundaries.

Many households rely on multiple sources of water for irrigation. Rivers are most commonly used (46%) followed by rainwater harvesting (38%), springs (31%), and lakes and ponds (5%). Fifteen percent of the households in our survey did not have agricultural land.

Climate resilience and disaster risk reduction

Increased human activity combined with climate change impacts are intensifying environmental degradation in many parts of the Lower Karnali watershed, and in some cases, intensifying the likelihood and effects of natural hazards such as floods, landslides and forest fires. (Figure 12). For this reason, a focus on building climate resilience and disaster risk reduction in the area is warranted.

In response, 27% of households reported adopting various climate resilience activities to help buffer the effects of disasters when they arise. The practices reported in the watershed include drip irrigation, tunnel farming, forest plantation, Gabion wire (to slow erosion), and water storage ponds, among others.

Local bodies at the watershed level have developed Local Adaptation Plans of Action (LAPAs) and Community Adaptation Plans of Action (CAPAs), which seek to provide blueprints for anticipating, mitigating, and responding to natural hazards and climate change impacts. Currently there are 16 LAPAs and 43 CAPAs operational in the watershed. LAPAs, in particular, advocate an integrated resource management approach that includes water, forests, energy, livelihoods, and infrastructure development.

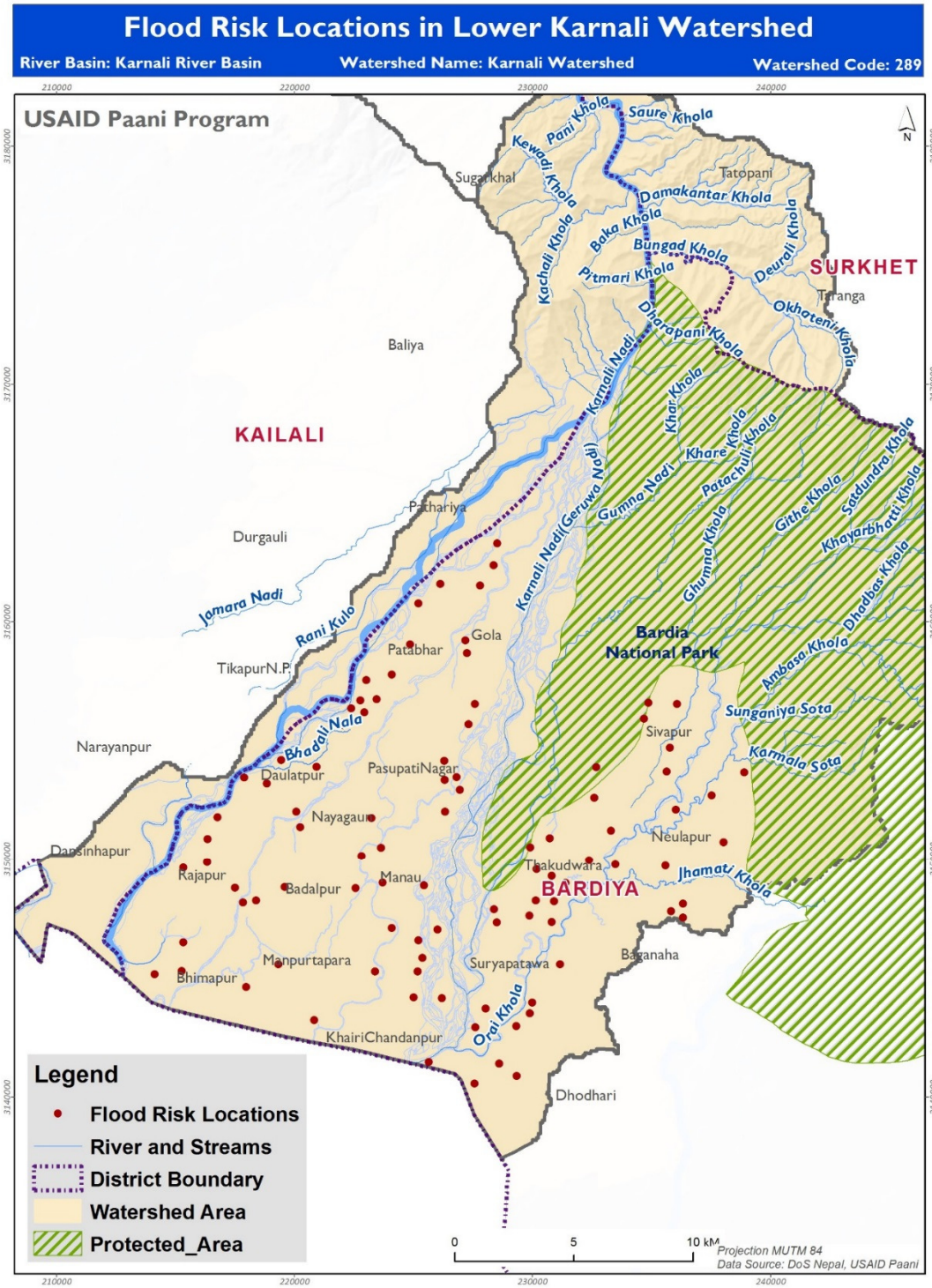

Figure 12: Flood Risk Locations in Lower Karnali

Early warning systems

Bardiya is one of the most flood-affected districts in Nepal, regularly enduring the inundation of thousands of hectares every summer. These floods not only consume valuable farmland but also exact a large toll of human and property loss from vulnerable families.

An early warning system (EWS) has been implemented with two rain gauges in Chepang and Ghairbari to warn people downstream in the Babai and Karnali river corridors, respectively. When rain intensity reaches a certain level, these systems emit warnings to the district emergency operation center and the district policy office. These two agencies then take responsibility to inform downstream communities.

Water takes between six and nine hours to travel between the warning system and the downstream communities. The warnings provide households with valuable extra minutes to collect important personal belongings and move to safer ground.

A second system connects Chisapani (at the north end of the watershed) with communities 1.5 hours downstream.

In spite of these developments in EWS, only 30% of households said they were aware of such systems in their area. Of those 30%, 98% said they had equal access to the information transmitted.

Power

Indicators in this section refer to the strength and accessibility of governance institutions in the watershed, as well as the level of inclusiveness across gender, caste, and ethnicity in decision-making processes.

Local institutions and inclusiveness

In the watershed, altogether there are 11 local governments that belong to three districts. In Kailali district, Janaki Nagarpalik's 25% and Tikapur Nagarpalika 34% land falls in the watershed. Similarly, 37% of Bardiya National Park and 100% Geruwa Nagarpalika, 39% Madhuwan Nagarpalika, 100% Rajabpur Nagarpalika and 77% Thakur Baba Nagarpalika in Baridiya district are covered by the watershed. The two local governments of Surkhet district that fall under the watershed have less than 14%

There are numerous organizations, federations and line agencies in the watershed that are responsible for managing the watershed to provide public services. Forty-eight community Forest User Groups (CFUGs) support watershed management and forest regeneration efforts in the area. Several federations focusing on drinking water and sanitation are also present. Due to its well-developed FMIS, several irrigation user groups provide support to ensure that irrigation systems are maintained, which helps sustain watershed health.

Other important local offices include the Department of Water-Induced Disaster Prevention (DWIDP), the Department of Soil Conservation and Watershed Management (DSCWM), the Department of National Park and Wildlife Conservation (DNPWC) and the Buffer Zone Management Committee (BZMC). Within the watershed, municipalities are accountable to prepare and implement specific programs with regard to forests, vegetation, biodiversity, soil conservation, and environmental conservation

Inclusion of marginalized groups appears to be an ideal not yet realized. The Chief Warden of Bardiya National Park reported that proper representation of women and minority representatives has not yet been achieved on the BZMC. They have fewer than the 33% of female participation mandated by law. However, looking at community-based anti-poaching units (CBPAU) in the watershed, we find that women are significantly active in this group, comprising 41% (299 women) of the total unit. Community-based forest groups claim 35% female membership. Looking at participation in community groups, 57% of Janajatis claim affiliation in at least one group, followed by Dalits (47%), and Brahmin, Chhetri & Thakura (46%).

Representation and participation

Among the total population, 54% of respondents are affiliated with community groups. Affiliation in saving credit groups is 41%, followed by cooperatives (36%), CFUG (30%), farmers group (8%), drinking water (4%), DRR and traditional groups (3% each), youth club (2%) and water users and irrigation (1% each). Even though the respondents said that there was 54% participation in community groups, active participation in decision making positions is limited to 9.6% of respondents. Since participation in decision making positions is so limited (9.6%), it is apparent that policy requirements to have at least one woman in a key position are not being complied with. It is also obvious that the voices of women and members of marginalized communities are not heard nor is agency is not promoted since only 5% women and marginalized groups are in the leadership position in local groups/ committee. It is also substantiated from the fact that almost 50% respondents reported to have equal access to services from such committees.

Although the local government planning process claims to be bottom-up, only 10% of respondents said that they are aware about VDC planning. Among them, 58% were aware of VDC planning, 27% were aware of LAPA, and 21% on CAPA processes. However, of the overall population, only 6% had information about VDC planning, 3% on LAPA and 2% in CAPA process. Effectiveness of the local planning process, LAPAs and CAPAs can also be assessed from the knowledge of the local people about these processes and action plans.

Policies, frameworks and regulations

Compliance with laws and implementation of policies is weak in the watershed. Although the Constitution of Nepal guarantees every citizen the right to live in a clean and healthy environment and management of harmful wastes is the responsibility of the producer of such solid waste [Solid Waste Management Act (SWMA), section 4(2)], these provisions have not been complied with. Urbanization and improperly managed waste and water pollution has been increasing in the watershed. The SWMA also imposes a duty on entities to reduce the amount of solid waste by making arrangements for its disposal or reuse [SWMA, section 5 (2)].

The Aquatic Animals Protecting Act 1961 prohibits use of electric currents or noxious materials into a water source with the intent to catch or kill aquatic life. However, destructive fishing practices exist in the watershed, including use of gill nets and noxious materials.

In spite of weak compliance with some laws, it is likely that implementation of the newly enacted Disaster Risk Reduction and Management Act will be effective in this watershed since both district plans have been developed and community disaster management committees are already institutionalized and

functional. The early warning system is effective, and there is good coordination between the Disaster Risk Reduction Committee chairperson and the Mayors of municipalities.

Implementation and enforcement of rules developed by groups such as the Raani Irrigation System and Budhi Kulo Irrigation System are effective. They are developed, owned and honored by the members of these systems.

Equitable access and benefit sharing

FMIS such as Rani Jamara Kulariya Irrigation System have been promoting access to water and sharing of benefits arising from use of water resources (ecosystems services and products). Although the Budhikulo management system does not discriminate among rich (large landholder) and poor (small landholder) during participation and contribution to irrigation work, it waives any household from labor contribution if the senior male member of the family is suffering from a serious ailment or someone dies in the family. Women members of women headed households are also required to contribute labor for cleaning and maintaining canals, although they are assigned less strenuous work such as fetching and serving drinking water. Nonetheless, current water use charges give no exemption to women headed or poor households. In the Raani Irrigation System, disabled headed or single women headed households are completely exempt from labor contribution for cleaning and maintenance of the irrigation canal.

It is likely that the drive for generating more revenue and increasing employment by the federal government and state governments will increase pressure on the river system. Local governments will be the first to bear the brunt of further degradation and loss of these resources and biodiversity. Building on their traditional management systems may enable them a long term perspective and prevent significant adverse environmental impacts on the watershed.

Watershed health assessment – Summary

The list of health indicators presented in this section takes into account factors related to biophysical health, infrastructure, socio-economic and governance within the watershed. Each of these indicators was assessed through consultation with stakeholders in the Lower Karnali watershed and assigned a score between 0-5 points.

We are concerned with initial assessment *and* on-going monitoring. We use the following rating system.

Color Symbol	Description	Treatment measures
[4-5 points] 	Good health condition, no additional treatment required	Intervention required to keep condition intact
[2-4 points]	Fair condition, functioning at risk, be alert to maintain and improve condition of the watershed	Promotion of good practices needed to improve health condition; special attention if not additional treatment may be necessary.
[<2 points] 	Poor condition, impaired functioning, decreased quality and quantity of ecosystem services in the watershed	Special measures must be adopted to restore watershed health conditions and ecosystem services

Based on the designated indicators for assessment, we rate the health status of the Lower Karnali watershed as ***moderately good*** (Table 1)**.** Water quality, household sanitation practices, and general land cover are among the most positive factors impacting watershed health. Water availability and declining agricultural productivity pose the most serious and immediate challenges to residents in the area. Unsustainable irrigation, fishing practices, and gravel mining will need more attention in the future.

Table 1: Summary of health indicators for the Lower Karnali watershed

Thematic area	Watershed health indicator	Rating	Rationale
WATER 	Water availability		- Of those (56%) who reported of water sources drying up, 83% report facing difficulties.
	Water accessibility		- 95% of households spend less than 30 minutes per day obtaining water - 89.5% of households say they have equal access to water
	Water quality		- 30% of households report of water quality they drink as 'bad', while only 10% reported as good and excellent.
	Household sanitation		- Water tested within health parameters with some slight elevation in ammonium and phosphate in some areas
	Solid waste disposal		- Growing urbanization is leading to an increase in non-point pollution sources
BIODIVERSITY & HABITAT 	Quantity of fish		- 69% say fish populations have declined
	Fishing practices		- Increased use of destructive fishing practices such as poison, electric current, and explosives

	Invasive species		- Water hyacinth is found in Bhagaraiya Lake
	Species diversity		- Flooding transfers some non-native species from aquaculture farms into waterways
	Land use and land cover		- 69 % of the household survey respondents said that native fish populations have decreased
SUSTAINABLE INFRASTRUCTURE	Sustainability of hydropower		- Only one hydropower plant under construction currently
	Sustainability of gravel mining		- Gravel mining has risen sharply in the last five years
	Sustainability of rural roads		- Government agencies continuing to issue licenses
	Sustainability of irrigation		- Roads in the area impede the natural flow of run-off and sediment transport, resulting in heavy siltation in the watershed - Only 25% of households have year-round irrigation.
CLIMATE RESILIENCE AND DISASTER RISK REDUCTION	Areas vulnerable to landslides, floods and landslides		- Thousands of hectares flooded annually during monsoon, incurring large losses of life, property and livestock
	Use of climate resilience adaptation practices		- Numerous households employing climate resilience activities, such as Gabion walls, tunnel farms, and pond water storage
	Households with access to early warning systems		- Only 30% of households said they were aware of EWS in their communities - Two systems in the watershed, though no siren system in place.

GOVERNANCE AND EQUALITY	Household members engagement/participation in local planning processes		- Households said little information about planning process was available - Only 10 % of respondents were aware of the local level planning process. Among them, 58% were aware of VDC planning process, 27% were aware on LAPA, and 21% on CAPA. - However, in overall population only 6% were aware on VDC planning, 3% on LAPA and 2% on CAPA.
	Community members are active in NRM groups [Biodiversity, disaster, climate change, water, agriculture, forest, irrigation, farmers]		- Low participation and low information at meetings - Many members have discontinued their membership in these groups
	Women, marginalized castes and ethnic groups hold key positions in NRM groups		- Low participation of women and marginalized groups, and underrepresented in leadership positions - Only 5% of women and marginalized groups are in the leadership positions in local groups/committees
	People comply with laws and policy provisions and local norms and standards		- Low awareness of policy, frameworks and guidelines (e.g., traditional livelihood communities not protected from commercial ventures)
	Government enforces laws and regulations		- The laws that are relatively effectively implemented and enforced are the Forest Act and National Parks and Wildlife Conservation Act - Other laws and policies related to natural resources are formalized but few are effectively implemented

	Conflicts over NRM [Water/benefit sharing, watershed issues, sand mining, irrigation, hydropower] issues are resolved		- Among the total population, 54% of respondents are affiliated with community groups. Affiliation in saving credit groups is 41%, followed by cooperatives (36%), CFUG (30%), farmers group (8%), drinking water (4%), DRR and traditional groups (3% each), youth club (2%), and water users and irrigation (1% each). - Although there is 54% participation in community groups, those holding decision making positions is limited to 5%. - Poor coordination among agencies positioned to implement and harmonize local practices and standards
	Good coordination between the, municipalities/rural municipalities, and provinces including government line agencies in the watershed		- Low coordination between government bodies - Different policies contain contradictory information (e.g., Forest Act and Local Self-Governance Act)
	Equitable access and benefit sharing arising from use of Natural resources (ecosystems services and products)		- No formal institutions and/or mechanisms in place to ensure equitable access in benefit sharing - Marginalized groups poorly informed about benefit sharing. In terms of access to services, almost 50% reported to have equal access to services from such committees.

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