



Climate Change Adaptation in Nepal

Stories from Salyan District

December 2022



Table of Contents

Acknowledgments	A
Introduction	A
Background	B
Stories from field	1
<i>A. Integrating Local Knowledge for Groundwater Recharge</i>	<i>1</i>
<i>B. Bringing Water to Households: Water Lifting Schemes</i>	<i>3</i>
<i>C. Kitchen Garden, Livestock and Sanitation</i>	<i>4</i>
<i>D. Return of The Migrants</i>	<i>5</i>
<i>E. Protection of Water Sources for Improved Water Supply</i>	<i>5</i>
<i>F. Enhancing Crop Production Through Improved Irrigation Canal</i>	<i>6</i>
<i>G. Improving Health with Total Sanitation Training</i>	<i>7</i>
<i>H. Changing Agriculture through Integrated Pest Management Training</i>	<i>8</i>
References	11

Acknowledgments

The collection of stories and writing of this report was conducted by Tabitha Black-Lock, disaster management intern for the International Federation of the Red Cross and Red Crescent Societies (IFRC) in Nepal. The collection of stories was supported by the Finnish Red Cross and Nepal Red Cross Society (NRCS). A special thank you to Sushma Shrestha and Kalpana Rijal at the Finnish Red Cross in Nepal for arranging the field visit and supporting the development of this report. This project could not be conducted without the support of the Nepal Red Cross Society, particularly the Integrated Community Resilience Project (ICRP) Team. Thank you to Buddhi Sagar Shrestha and Nanda Raj Thapaliya from Nepal Red Cross Society for providing information about the ICRP activities in Salyan District and a sincere thank you to Sirjana Devkota for her coordination, translation, and other invaluable support during the field trip to Salyan district. Another sincere thank you to the Salyan District and Darma Rural Municipality sub-chapter staff and volunteers for their warm welcome and support with logistics and connecting with community members. In addition, thank you to Kiran Acharya from NRCS for his help in designing stories.

Introduction

In January 2021, Nepal Red Cross Society (NRCS), with the support of the Finnish Red Cross Society, implemented the Integrated Community Resilience Project (ICRP) in two municipalities in Nepal: Darma Rural Municipality in Salyan District and Madi Rural Municipality in Rolpa District. The purpose of this project is to enable healthy, safer, and resilient living in these communities, by addressing health, climate change adaptation, livelihood, water and sanitation, and institutional capacity building.

Following the implementation of ICRP activities, a field visit to Darma was conducted to collect stories on the impact of these activities on the lives and livelihoods of community members. This report showcases stories collected from community members and applies a climate change lens to demonstrate how these projects contribute to climate change adaptation and resilience in the community. This report focuses on 6 implemented ICRP activities: groundwater recharge pond, water lifting scheme, water source protection, irrigation canals, sanitation training, and Integrated Pest Management (IPM) Training. Verbal consent was provided by community members for the inclusion of their names, stories, and pictures in this report.

Background

Nepal is highly vulnerable to climate change and the Asian Development Bank estimates that Nepal could lose 2.2% of its annual GDP by 2050 due to climate change¹. In general, the climate of Nepal will be significantly warmer and wetter in the future, except for a decrease in precipitation during the pre-monsoon season. Indices of climate extremes related to temperature and precipitation suggest that more extreme events are likely in the future, including floods, droughts, landslides, and glacier lake outburst floods. Ranked 44 out of 191 countries by the 2022 Inform Risk Index, Nepal is one of the higher hazard risk countries in the world, with over 80 percent of the population exposed to at least one of these hazards². The occurrence of these hazards has significant impacts on water access, sanitation, health, disaster management, agriculture, gender, inclusion and livelihoods³.

Like other hilly areas of Nepal, Salyan District has been experiencing changes in rainfall patterns, temperature, and challenges with water accessibility. Recent years have shown low amounts of rainfall, increased drought, and heavy rainfall resulting in flooding. The agricultural sector is significantly impacted by these changes, as the winter season is being pushed back several months and planting patterns are changing, reducing the productivity of crops. Salyan District NRCS staff estimate that lower production of crops means that only 25% of vegetables can be sold, whereas historically high production allowed for 75% of vegetable crops to be sold while meeting subsistence needs. There are also higher risks of landslides due to extreme weather and road construction. Furthermore, water sources and levels have been decreasing over the years, impacting sanitation, health, and agriculture, while also pushing people to migrate to other districts and even neighboring country India for work.

¹ *WBG report-2021*

² *UNDRR 2019 as cited by Kapoor et al., 2021*

³ *MoFe, 2019*

Stories from field

A. Integrating Local Knowledge for Groundwater Recharge

Over 40 years ago, in Wards 3 & 4 of Darma Rural Municipality, Salyan District, there was a pond situated at the top of a hill. Khum Raj Rawat (shown Figure 1), a long-time member of the community, remembers visiting this pond, where animals such as leopards, deer, monkeys, rabbits, and birds used to drink and bathe. He recalls how vibrant and lush the surrounding area was: home to many plant species, animals, and small springs. However, over time he saw the pond slowly disappear. Since the loss of the pond, community members have noticed a



Figure 1: Khum Raj Rawat in front of groundwater recharge pond

reduction of trees species and biodiversity, loss of water sources at the top of the hill, and migration of animals closer to the community settlements in lower areas of the hill, where they have increasingly been eating and destroying crops.

In the past few years, the community has also noticed a decrease in the downhill spring's water levels. For people living in upper watersheds in hilly regions, such as Ward 3 & 4, springs are the primary source of water and are essential for rural livelihoods. Springs are especially critical for agricultural production during dry seasons, as they provide access to water from the groundwater aquifers*. However, as the community has experienced long periods of drought and more extreme, but less frequent rainfall, they have faced challenges with low water levels in the main spring water source in the lower part of the hills. This may be attributed to the impacts of climate change, such as



Figure 2: NRCS staff and volunteers with some of the community members involved in the construction of the pond

decreasing rainfall, as well as land-use changes such as deforestation, road and infrastructure development, and agricultural expansion*. Increased periods of drought impact the ability of soil to absorb water. When rainfall does occur after drought, it is increasingly more severe and heavy, making it more difficult to be absorbed into the ground. This leads to water runoff and a reduction of groundwater supplies⁴.

As part of a climate change awareness training facilitated by the NRCS in 2021, the community discussed the impacts of climate change on the spring water sources and the decline in groundwater. Community

* Dhaubanjari et al., 2019

⁴ McCarthy et al., 2001

members recalled the historical pond and the negative changes they had seen since its disappearance. This local knowledge, combined with the NRCS expertise in water management and knowledge of recharge ponds in other districts, raised the discussion of the potential benefits of reconstructing the historical pond. Therefore, the community asked the NRCS to provide the support needed to reconstruct the pond in the historic location. In 2021, NRCS staff and volunteers, local government, and community members rehabilitated the pond, which is 28 meters long, 16 meters wide, and 1.15 meters high (as shown in Figure 3). Because the reconstruction of the pond in this community was done recently, the potential benefits of the pond are not fully visible. As President of the Malika Community Forest Committee and Secretary of the Water Recharge Pond Construction Committee, Mr. Rawat believes the pond will bring many benefits to the community. Studies in other parts of Nepal also show the potential benefits of the recharge pond.



Figure 3: Constructed water recharge pond, Darma Rural Municipality

Firstly, the community expects the recharging of the water will lead to an increase in the spring water levels at the base of the mountain and may also lead to the re-emergence of uphill springs as the groundwater aquifers replenish. Ponds can play an important role in recharging underground aquifers that supply spring water sources. Recharge ponds allow for rainwater and surface water runoff to be captured and accumulated in the pond, and slowly re-absorbed into the subsurface soil. This increases the infiltration of rainwater into the groundwater aquifer and aids the natural recharge of springs*. Recharging and sustaining groundwater aquifers can increase water availability throughout the year, which can reduce community reliance on rainfall, which is becoming less predictable and frequent with the changing climate*. Sustaining spring water sources is therefore part of building climate resilience in hilly and mountain areas*.

Secondly, the slow funneling of water into the soil can support further plant growth, which will enhance the natural beauty of the area. Reconstruction of the pond was done alongside the protection of the surrounding forest from deforestation and grazing of domestic animals, to allow for plant regrowth. Integrating pond recharging with afforestation can further promote groundwater recharging by enhancing the water absorbability of the soil*. The construction of the pond has also become a draw for tourists who are interested in seeing the pond, as well as the natural beauty of the area.

Community members expect that the increase in tourists visiting the area can enhance the local economic market.

Finally, ponds provide an important water source for animals. Since the construction of the pond, the community has seen signs of animals such as rabbits, monkeys, and leopards

* Shrestha et al, 2021



Figure 4: Community members and NRCS discussing the benefits of constructed pond

returning to the pond. This provides benefits for the community. Since the loss of the pond, animals have migrated closer to the community and have been destroying crops. With the return of the pond water source, the community anticipates animals will return uphill to the forest area and away from the community.

The construction and maintenance of the pond are overseen by the local Water Recharge Pond Construction Committee, allowing for local ownership of the project. The construction of the recharge pond has also been integrated into the local government climate adaptation plan. The community is interested in reconstructing other historical recharge ponds in a nearby area but lacks the necessary funds.

The construction and

Knowledge of the potential benefits of the recharge pond can be applied to other areas of Nepal where traditional knowledge of historical ponds exists. By providing awareness of climate change adaptation within communities, and knowledge about recharge ponds in other project areas, the NRCS can work with communities to identify whether the reconstruction of historical ponds can be a benefit for the community.

B. Bringing Water to Households: Water Lifting Schemes

For the Malaki community in Darma Municipality, access to water has been an issue for a long time. While most community members live on the side of a hill, the main water source is situated at the bottom of the hill. This means that community members have historically needed to walk hours down and uphill to collect water and bring it to their homes. Challenges in the accessibility of water have been exasperated by changes in water levels linked to climate change. Alternative sources of water have disappeared and water levels in the main spring source are decreasing.



Figure 5: Household water tap stand

To enhance access to water within the Malika community, in 2021 the NRCS worked with the community to construct a water-lifting scheme. This project included the installation of a water reservoir tank to collect and store water for distribution, solar panels to power the water lifting system, and water taps in 37 households and 1 school. Using solar energy, which minimizes greenhouse gas emissions, water is pumped from the spring at the bottom of the hill into the water reservoir tank. Every morning and evening, the water reservoir tank is opened, and water is pumped directly to the household taps. Conversations with community members with taps installed in their homes reveal the many benefits of the water-lifting scheme.

C. Kitchen Garden, Livestock and Sanitation

Kalpana Bohara Rawat (shown in Figure 6) tells the story of how she used to wake up at 3 am to walk for one hour to fetch water at the downhill spring. Once arriving, the queue to get water was so long that she would wait 2-3 hours before filling up her water container and walking back home. In the evening, she would return to collect more water. Since the construction of the water lifting system, which brings water directly to a tap in her home, she no longer needs to wake up at 3 am to collect water and therefore benefits from an undisturbed, full night's sleep. With the energy and time saved, she can conduct household chores, collect grass for livestock, and develop alternative livelihood opportunities.



Figure 6: Kalpana Bohara Rawat working in her kitchen garden

Another major benefit for Kalpana and other community members is the newfound opportunity to grow kitchen gardens. While in the past there was not enough water to irrigate a garden at home, Kalpana now uses tap water to grow a variety of vegetables, including beans, leafy vegetables, and citrus. Not only does this provide fresh vegetables for her family, but it also helps them save money on buying vegetables from the local market. When production is good, she is also able to sell surplus vegetables to generate additional income for her family.

The installation of the water lifting system has also generated the opportunity to raise livestock. While previously water access was insufficient for the family, now there is



Figure 7: Kalpana Bohara Rawat rearing buffalo and cow

enough to support the raising of buffalo and cows. For the first time, Kalpana and her family produce 2.5 L of fresh milk each day, which they drink and make into curd and ghee. In addition to feeding the family, the milk, ghee, and curd can be sold at the local market, contributing an extra 8000 Nepalese Rupees in income per month. The additional income is used for the children's education costs and for buying food and clothing.

Finally, Kalpana and other community members express the major hygiene and health benefits of having easy access to clean water. Previously, there were many challenges to proper sanitation, bathing, washing clothes, and cleaning dishes due to limited access to water. Now, with easy access to tap water, and additional sanitation training provided by the NRCS, sanitation and health are tremendously improved in many households. Community members expressed happiness in being able to provide guests with proper water, sanitation, and even fresh curd.

D. Return of The Migrants

Another major benefit of the water-lifting systems is the return of migrant families to the community. Birimi Nepali (shown in Figure 9), her husband Kali Bahadur Nepali, and their two daughters migrated to India 2.5 years ago due to the lack of safe drinking water. However, in January 2022, after the installation of the water lifting scheme in Ward 4, their family was able to return home. Similarly, another community member, Mungal Rawat, migrated to the neighboring Dang district 5 years ago due to a lack of water access.

Now, with the lifting system installed, he too has returned to the community to be with his family.



Figure 8: The family of Birimi Nepali

E. Protection of Water Sources for Improved Water Supply

Ward 3, Darma is another community experiencing water scarcity. Previously, community members walked far to the spring to collect water and waited for hours in a queue, with no promise of there being adequate water available. Over time, they have noticed water sources disappearing and water levels in the spring decreasing. Part of the problem is the erosion of these sources by landslides and animals. Forecasts predict that changing weather patterns, including more extreme rainfall and droughts, will continue to impact water supplies by damaging water supply infrastructure, contaminating water sources, and lowering water levels⁵.



Figure 9: Example of water source protection

Because of these challenges, in 2021 the community and NRCS implemented a water source protection scheme to protect the spring and allow for water to accumulate into a steady stream, rather than be dispersed through water runoff. Water source protection includes planting trees to reduce landslides and flooding, as well as building fencing and concrete structures to protect the source from animals. This is especially important due to the loss of traditional water sources in recent years. With lower water levels in the spring, the community has been facing water scarcity. Due to the water source protection combined with a water scheme bringing water to households through pipes, community members

⁵ Kapoor et al., 2021



Figure 10: Kalika Hamal in her kitchen garden

have much easier access to water. The Basthana water supply scheme utilizes gravity flow to bring water from higher sources to households.

Community members such as Kalika Hamal have already experienced the benefits of water source protection and resulting higher levels of water. She has been able to start growing vegetables in a kitchen garden, rather than buying them at the market. As seen in figure 12, she is growing beans, corn, chili, millet, maize, and eggplant. The community is hoping that in the future they can rehabilitate the irrigation channels to allow rice paddies to be grown closer to their homes.

F. Enhancing Crop Production Through Improved Irrigation Canal

Obir Basnet is a rice paddy and soybean farmer in Ward 2, Darma Rural Municipality. In the past years, he has observed how rain during the winter season has become more extreme, leading to flooding. During the summer, periods of drought have become longer. Because of decreasing water levels, inconsistent rainfall, loss of water sources, drought, and flooding, he has experienced a loss of crop production due to insufficient water.



Figure 11: Mr. Obir Basnet in his paddy field

Across Nepal, it is estimated that up to 90% of crop losses are caused by weather and climatic events, with 40% of losses caused by drought and 23% caused by floods (Ramasamy & Regmi, 2014). Droughts and increased water evaporation due to higher temperatures impact the availability of stream water for irrigation. Delayed monsoons, longer dry spells and periods of extreme rain affect crops planted in spring; whilst winter crops experience less water availability during critical growth periods due to drier winters (Joshi & Joshi, 2019). Increasing extreme rainfall and a rise in the number of wet days will lead to more frequent and worse flash floods and landslides (ibid), which can destroy and block natural irrigation channels if they are not reinforced.

To address these impacts of climate change, in December 2021, community members and the NRCS repaired the irrigation canal, which runs along the embankment of the stream. This included clearing the channel and reinforcing it with concrete to strengthen it against extreme rain, landslides, and flooding that had previously filled the channel with mud and blocked water flow. Along with the reinforcement of the irrigation channel, the community also planted trees to provide stability to the soil and help protect the channel from landslides and flooding. They also constructed a dam of rocks in the spring, to allow water to be diverted to the irrigation channel during periods of low water levels water. This helps concentrate the water in the channel and increases water levels.



Figure 12: Mr. Obir Basnet next to the repaired irrigation canal

Obir Basnet is now the President of the Irrigation Channel Users Committee, which monitors water levels and maintains the irrigation channel. Already, he has seen the positive impacts of the irrigation channel. The water levels reaching his farm are now higher, as less water is lost along the way due to blockages and dispersion. He believes that there will be even more benefits in the future, as the more reliable irrigation channel and ability to adjust the water flow with the dam will enhance crop production. Since the crops provide a primary source of livelihood for his family (brother, wife and 2 children), he plans to utilize the increased income to pay for his children's education and basic needs. Like other farmers in the community, Obir Basnet is very happy with the constructed irrigation canal and hopes that more resources will be available to rehabilitate other remaining sections of the irrigation canal in the area.

6. Improving Health with Total Sanitation Training

Bhuma KC and Bimala KC are two of the many community members that participated in the 2021 Total Sanitation Training in Ward 3, Darma Municipality. Months after participating in the training, they have seen positive impacts in their community. The purpose of the Total Sanitation Training is to enhance sanitation and health in communities by focusing on 6 indicators of sanitation: proper use of toilets, hand washing practices, safe use of water, safe food preparation and management, household sanitation, and environmental sanitation.

In the past, the community has experienced health challenges including dysentery, typhoid, cholera, and jaundice, which spread through contaminated food, unsafe water, and poor sanitation. The Total Sanitation Training generates awareness about how to avoid the spread of these diseases through proper handwashing techniques, sanitation, and waste management. As the Female Community Health Coordinator for the community, Bhuma KC is aware of the many health issues. Since the participation of community members in the sanitation training, she has noticed fewer people falling ill, particularly children.

The program also provides awareness training regarding proper waste management. Bhuma KC and Bimala KC learned about the negative impacts of burning waste on human and environmental health. The burning of plastic waste, which is a common practice across Nepal, releases toxic gases that pollute the air and contribute to climate change (Verma et al., 2016). The particles released, also referred to as persistent organic pollutants, contribute to negative health risks such as heart disease, neurological damage, cancer, asthma, nausea, headaches, and damage to the nervous system (ibid). A 2015 study of garbage burning in India and Nepal found that garbage burning emissions could result in 300,000 premature deaths from the chronic obstructive pulmonary disease across



Figure 13: Bhuma KC and Bimala KC

the two countries⁶. Littering of plastic also increases the spread of diarrheal diseases and can contribute to the reduction in soil fertility as it releases chemical toxins.

As part of the Total Sanitation Training, community members learned new techniques for managing garbage, starting with the sorting of degradable and non-degradable waste, and utilization of organic waste for compost. Rather than burning plastic, they try to reduce their consumption of plastic, recycle, and reuse plastic when possible. Reducing the consumption of plastic has positive benefits for the environment, as the production of plastic itself is resource intensive and contributes to high levels of greenhouse gas emissions (Verma et al., 2016). Following the training, Bhuma KC and Bimala KC noticed that community members are integrating safer waste management, and there has been a reduction in plastic consumption and litter. While awareness about sanitation has increased in the community, they still experience some challenges in accessing safe water for drinking, bathing, and washing due to decreasing water levels.

H. Changing Agriculture through Integrated Pest Management Training

Renuka Shasma, Sita Hamal, and Anjana Rijal are three of the thirty-three women and 2 men participating in Integrated Pest Management (IPM) training in Ward 2, Darma Municipality. During the 16-week course, which was held once a week for a day, participants learned different approaches to growing plants, making and using organic fertilizer, and techniques for reducing pest damage during farming. Based on community needs, this course focuses on managing the growth of tomato plants for their full life cycle. The techniques taught can be applied to a variety of different crops.



Figure 14: Renuka Shasma, Sita Hamal and Anjana Rijal in the green house

This training comes at an important time for the community. In the past few years, they have experienced the increased impacts of pest infestation and the emergence of new pests, like the rice hispa, which appeared for the first time last year. The increase and emergence of pests are linked to changing temperatures and seasons due to the changing climate. Shifting weather patterns, such as higher temperatures, more wet days, and longer droughts are connected to the emergence of new pests and diseases in crops and livestock⁷. As the presence of pests and diseases has increased so has the use of pesticides across the country⁸. The Plant Quarantine and Pesticide Management Centre estimates that the import of pesticides for commercial farming is increasing 15% annually since 2019, with 85% being used on vegetables (ibid).

While community members often use market chemical pesticides to control pests damaging their crops, as the IPM training teaches, there are many negative impacts of

⁶ Saikawa et al., 2020

⁷ Ramasamy & Regmi, 2014

⁸ Prasain, 2021

pesticides on human health and the environment. High levels of pesticides on fruits and vegetables have been shown to cause nausea, diarrhea, abdominal cramps, dizziness, and anxiety, with longer terms impacts including kidney failure, lung disease, and mental health problems (Prasain, 2021). Chemical fertilizers, which are also used readily across Nepal, have negative impacts on environmental health. Ammonia, the key component in chemical fertilizers, is made from burning fossil fuels like coal and methane gas, which produces carbon dioxide contributing to climate change. Globally, the production of ammonia contributes to 1-2% of CO₂ emissions⁹. The use of these fertilizers also has long-term impacts on soil health by decreasing soil fertility and the presence of minerals, hardening the soil and reducing its capacity to absorb water and polluting air, water, and soil¹⁰. These impacts decrease agricultural



Figure 15: IPM training being conducted in the community

production over time and increase the vulnerability of crops to disasters such as floods (ibid). Greenhouse gas emissions can be reduced by addressing reliance on fertilizers, pesticides, and other inputs in agriculture. Therefore, the IPM training spreads awareness about the negative impacts of chemical pesticides and fertilizers and teaches participants to develop organic fertilizers and pesticides by using simple household ingredients. The use of organic compost as fertilizer enhances the water absorption of soil, therefore increasing adaptability to drought and extreme rain associated with climate change (Pahalvi et al., 2021). With traditional cropping approaches, plants are densely grown without any spatial planning or branch cutting and management. Chemical fertilizer is applied liberally over plants. With IPM, technical measurements are utilized to space out plants in a row, actively manage and cut branches, and apply organic manure intentionally to the base of plants. The IPM techniques can be used on small scales, such as kitchen gardens, and even on larger scales such as paddy farms. As part of the training, participants can see how applying different techniques can lead to faster plant growth



Figure 16: NRCS HQs team with community IPM participants

and an increase in production. Over the 12 weeks, the class monitors and compares the growth of tomato plants using traditional farming techniques and those grown using IPM techniques. Even halfway through the course, it was evident to participants that tomato plants grown with IPM grow much faster and higher than traditionally managed tomato plants.

Renuka Shasma, Sita Hamal, and Anjana Rijal are excited about what they are learning in the IPM

⁹ Manthiram & Gribkoff, 2021

¹⁰ Pahalvi et al., 2021

training. Like other participants, they are practicing IMP techniques by growing tomatoes in kitchen gardens at home. While they are now focusing on growing tomatoes, once the training is complete, they hope to expand their gardens by including potatoes, cucumber, cauliflower, and cabbage. They are also keen to diversify their crops by planting new types of seeds. They believe using the IPM techniques will help increase production, enhance resilience to climate change, and improve human and environmental health. As production increases, they hope to both feed their family fresh, organic vegetables, and sell the surplus in the local market to supplement their livelihoods.

References

- Dhaubanjhar, S, Swingle, C., and Charati, L. (2019). Recharging Nepal's Mountain Springs. *International Water Management Institute*. Retrieved from <https://www.iwmi.cgiar.org/2019/06/recharging-nepals-mountain-springs/>
- IPCC (2001b). Climate Change 2001: Impacts, Adaptation, and Vulnerability. Contribution of WG II to TAR of the Intergovernmental Panel on Climate Change [McCarthy, M.C., O.F. Canziani, N.A. Leary, D.J. Dokken and K.S. White (eds.)] Cambridge, 1031.
- Joshi, G. R. and Joshi, B. (2019) 'Climate Change Impact on Agricultural Sector of Nepal: Implications for Adaptation and Resilience Building', in Thapa, G., Kumar, A., and Joshi, P. K. (eds) *Agricultural Transformation in Nepal: Trends, Prospects, and Policy Options*. Singapore: Springer, pp. 119–155. http://doi.org/10.1007/978-981-32-9648-0_6.
- Kapoor et al. (2021). Climate Change Impacts on Health and Livelihoods: Nepal Assessment. *International Federation of the Red Cross*.
- Manthiram, K. & Griboff, E. (2021). Fertilizer and Climate Change. *MIT Climate Portal*. Retrieved from <https://climate.mit.edu/explainers/fertilizer-and-climate-change>.
- McCarthy, J. J., Canziani, O. F., Leary, N. A., Dokken, D. J., & White, K. S. (Eds.). (2001). Climate change 2001: impacts, adaptation, and vulnerability: contribution of Working Group II to the third assessment report of the Intergovernmental Panel on Climate Change (Vol. 2). Cambridge University Press.
- Ministry of Forests and Environment [MoFE] (2019). Climate change scenarios for Nepal for National Adaptation Plan (NAP). Government of Nepal.
- Pahalvi, H. N., Rafiya, L., Rashid, S., Nisar, B., & Kamili, A. N. (2021). Chemical fertilizers and their impact on soil health. In *Microbiota and Biofertilizers, Vol 2* (pp. 1-20). Springer, Cham.
- Prasain, K. (2021). Pesticides use on vegetables continues but more is being used to fight climate change impact. *The Kathmandu Post*. Retrieved from <https://kathmandupost.com/national/2021/01/27/pesticides-use-on-vegetables-continues-but-more-is-being-used-to-fight-climate-change-impact>
- Ramasamy, S. and Regmi, K. R. (2014) Managing climate risks and adapting to climate change in the agriculture sector in Nepal. Rome: Food and Agriculture Organization of the United Nations (Environment and natural resources management series, 22).
- Saikawa E, Wu Q, Zhong M, Avramov A, Ram K, Stone EA, Stockwell CE, Jayarathne T, Panday AK, Yokelson RJ. Garbage Burning in South Asia: How Important Is It to Regional Air Quality? *Environ Sci Technol*. 2020 Aug 18;54(16):9928-9938. doi: 10.1021/acs.est.0c02830. Epub 2020 Jul 31. PMID: 32628470.
- Shrestha, S., Devkota, K., Dahal, N., & Neupane, K. R. (2021). Application of Recharge Ponds for Water Management: Explaining from Nature Based Solution Perspective. *Dhulikhel's Journey towards Water Security*, 142.
- Verma, R., Vinoda, K. S., Papireddy, M., & Gowda, A. N. S. (2016). Toxic pollutants from plastic waste-a review. *Procedia Environmental Sciences*, 35, 701-708.
- World Bank Group [WBG] (2021). Country: Nepal. Climate Change Knowledge Portal. Retrieved from <https://climateknowledgeportal.worldbank.org/country/nepal/climate-data-historical>

Fundamental Principles of the Red Cross and Red Crescent Movement

Humanity

The international Red Cross and Red Crescent Movement, born of a desire to bring assistance without discrimination to the wounded on the battlefield, endeavors, in its international and national capacity, to prevent and alleviate human suffering wherever it may be found. Its purpose is to protect life and health and to ensure respect for the human being. It promotes mutual understanding, friendship, cooperation and lasting peace amongst all peoples.

Impartiality

It makes no discrimination as to nationality, race, religious beliefs, class or political opinions. It endeavors to relieve the suffering of individuals, being guided solely by their needs, and to give priority to the most urgent cases of distress.

Neutrality

In order to continue to enjoy the confidence of all, the Movement may not take sides in hostilities or engage at any time in controversies of a political, racial, religious or ideological nature.

Independence

The Movement is independent. The National Societies, while auxiliaries in the humanitarian services of their governments and subject to the laws of their respective countries, must always maintain their autonomy so that they may be able at all times to act in accordance with the principles of the Movement.

Unity

There can be only one Red Cross or one Red Crescent Society in any one country. It must be open to all. It must carry on its humanitarian work throughout its territory.

Voluntary service

It is a voluntary relief movement not prompted in any manner by a desire for gain.

Universality

The International Red Cross and Red Crescent Movement, in which all Societies have equal status and share equal responsibilities and duties in helping each other, is worldwide.

The Fundamental Principles were adopted by the XXth International Conference of the Red Cross, in 1965. In 1986, the XXVth Conference decided to include them in the Preamble of the Statutes of the Movement. The latter not only recalls that every component of the Movement is bound by the Fundamental Principles but also establishes that States have to respect at all times the adherence of those components to the Fundamental Principles.



National Headquarters
Red Cross Marg, Kalimati
Email: nrcs@nrcs.org, info@nrcs.org
Phone: +977-1-4272761
Post Box No.: 217
Fax: +977-4271915, 473285