Climate Change Adaptation and Disaster Risk Reduction Plan for the Agriculture and Livestock Sector

Suddhodhan Rural Municipality, Kapilvastu, Nepal

Summary of the Draft Ten-Year Plan

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2018

Prepared for Suddhodhan Rural Municipality under

FAO project GCP/NEP/070/LDF

Underlying draft plan drafted by Nature's Conservation Pvt. Ltd., Kathmandu, 2018

About This Report

This report provides a summary of the draft climate change and disaster risk reduction plan for agriculture and livestock in Suddhodhan Rural Municipality. In my role as the Assistant Agriculture Officer, **I conducted the field assessment that informed the plan. This included field visits to all 18 communities across the municipality's six wards.** I also led focus group discussions and participatory rural appraisals to identify local hazards, document losses and existing coping practices, and determine community adaptation priorities. Nature's Conservation Pvt. Ltd. prepared the draft plan under FAO project GCP/NEP/070/LDF, drawing on the field assessment and my contributions to the planning process. This report outlines the objectives, methodology, and principal findings of that work.

1. Background

Suddhodhan Rural Municipality faces a serious problem: its cultivable land base is shrinking while the climate it depends on is becoming less reliable. Cultivable land has fallen from roughly 82.83 km^2 in 1996 to about 74.55 km^2, and continues to decline through fragmentation and settlement growth. At the same time, rainfall is falling and temperatures rising. We have suggested a ten-year plan (2075–2085 BS; 2018/19–2028/29) to reduce climate and disaster risk across its agriculture, livestock and fisheries sectors.

The municipality is one of ten local units in Kapilvastu district, formed by merging six former village development committees — Patariya, Najdanagar, Lawani, Bithuwa, Hathihawa and Baskhor — now organised as six wards. It covers 91.99 km^2 of flat, fertile terrain at 89–105 m above sea level, on the highway linking Lumbini with the ancient Kapilvastu capital at Tilaurakot. Mean annual temperature is about 25°C and mean annual rainfall about 1,482 mm. The population is 45,201. Some 91 % of cultivated land is under cereals, and 3,991 households farm at subsistence scale.

The plan was prepared by the municipality's thematic committee on agriculture, livestock, disaster and environment, with technical facilitation from the Food and Agriculture Organization. It follows the national guideline for formulating climate change adaptation and disaster risk reduction plans (2075 BS), and rests legally on the Local Government Operation Act (2074 BS), which assigns local governments responsibility for agricultural development and disaster management.

2. Objectives

The plan's overall aim is to reduce the effects of climate change and disaster risk on crop farming, livestock and fisheries, and to help the municipality adapt to changed conditions. Four specific objectives follow from it:

1. To identify the effects of climate change, extreme events and disaster risk on crops, livestock and fisheries at ward level, and to identify adaptation and risk-reduction measures in response.
2. To define the strategic actions needed to make the municipality's annual agricultural programme risk-informed and practicable.
3. To establish a mechanism for integrating ward-level priorities into the annual plan and budget.
4. To secure the participation of local farmers and of all agencies working in the sector.

3. Method

The assessment combined participatory ward-level enquiry with analysis of long-term climate records.

- **Institutional set-up.** An inaugural meeting of the municipal executive, assembly members

and sector agencies on 2075/05/22 constituted the plan formulation committee. A three-day course (2075/05/22–24) trained the committee in vulnerability and capacity analysis (VCA) and multi-criteria analysis (MCA).

- **Ward-level data collection.** Ward committee meetings were followed by six focus group discussions, one per ward, with three communities selected in each. Data were gathered against 37 indicators grouped under five themes, using hazard listing and ranking, historical timelines, hazard and resource mapping, and seasonal and crop calendars.
- **Climate analysis.** Thirty years of records from the Taulihawa station and gridded rainfall data (1980–2015) were analysed for trends in temperature, rainfall and extreme events.
- **Risk framework.** Vulnerability was treated as the combination of sensitivity and adaptive capacity; risk as the combination of hazard characteristics, exposure and vulnerability. Each dimension was scored and classified into five bands, for two periods (about twenty-five years ago, and the last five years), with a projection to 2030.
- **Option screening.** Ward priorities were ranked by multi-criteria analysis against nine criteria: damage-reduction effectiveness, cost effectiveness, contribution to local livelihoods, alignment with national priorities, public participation, co-benefits, scalability, ease of implementation, and sensitivity to women.

The resulting Vulnerability and Risk Assessment (VRA) report is the analytical basis of the plan.

4. Main findings

4.1 Climate trends

The records indicate that the climate is becoming warmer, drier, and more variable. Annual rainfall is decreasing by about 10 mm per year, while the mean annual temperature is increasing by approximately 0.005°C per year. The number of hot days is increasing, and the number of cold days is decreasing, both by about 0.001 day per year.

The difference between daytime and nighttime temperatures is also becoming smaller. The mean annual maximum temperature is decreasing by 0.017°C per year, while the mean annual minimum temperature is increasing by 0.019°C per year. In addition, the monsoon now begins and ends later. Consecutive dry days are increasing, while the number of rainy days is decreasing.

4.2 Hazard profile

Drought is the dominant hazard, followed by crop and livestock pests and diseases, cold waves and inundation, with windstorms, hail and crop raiding by wildlife also significant.

Drought periods have increased by 40–60 days over the past five years. Springs, wells, and constructed ponds are drying up, and soil moisture is no longer sufficient for agricultural production. During moderate to severe drought years, wheat losses range from 10% to 100%. In the 2071 BS drought, farmers in Ward 6 were unable to plant wheat. Losses also range from

Table 1: Ward-level ranking of principal hazards affecting agriculture (1 = most severe)

Hazard	W1	W2	W3	W4	W5	W6
Drought	1	1	2	1	5	1
Crop pests and diseases	2	2	1	2	1	2
Livestock pests and diseases	4	3	3	3	1	3
Cold wave	3	4	5	4	5	7
Inundation	7	–	9	–	6	4

30% to 70% for paddy, 20% to 60% for orchards, and 10% to 40% for livestock.

Pest and disease problems are closely linked to drought, and the period of impact has increased from about four months to as long as nine months. Losses range from 25% to 70% in paddy, 20% to 40% in vegetables, and 10% to 25% in wheat. Livestock diseases are most severe in Wards 3 to 5, where cross-border animal movement is highest. Wards 3 and 4 have also experienced avian influenza.

The cold-wave period has shifted from Mangsir–Falgun to Poush–mid-Falgun. In Ward 1, cold waves have caused losses of 60% in potato, tomato, mustard, and onion; 50% in linseed; and 40–50% in pulses. Flooding and inundation, which were once the main hazards, are now less common but may occur during any monsoon. Crop damage caused by wild cow and wild boar accounts for 15–70% of annual cereal and vegetable production and is considered a major local hazard.

4.3 Vulnerability and risk

Exposure is highest in Wards 1, 4, and 6. In these wards, cropland is vulnerable to drought, as well as to inundation and soil erosion during intense rainfall. Traditional animal sheds, poultry populations, and pond areas are also concentrated in these locations. Sensitivity is highest in Ward 5 and remains high in Ward 6, mainly because of declining rainfall during the paddy and wheat sowing periods.

Adaptive capacity did not change between the two assessment periods, which is an important finding. Ward 5 has the highest number of trained agricultural technicians while Ward 4 has the highest number of livestock technicians. Ward 5 is the only ward with produce collection facilities and livestock insurance coverage. Ward 6 has the lowest level of mechanisation and no awareness of crop insurance. Across the municipality, there are no trained fisheries professionals.

Ward 1 emerges as both the most vulnerable and the highest-risk ward in all three periods, reflecting limited access to trained technicians, seed selection knowledge, organic fertiliser know-how and mechanisation. Ward 4 carries high risk now and in the projection. Ward 5, with the strongest human and physical assets, carries the lowest risk despite its high sensitivity.

4.4 Institutional strengths and gaps

The municipality's principal strength is institutional: it created a separate thematic committee for disaster risk reduction, placed agriculture within the economic sector, and allocates

Table 2: Vulnerability and risk assessment results by ward (VH = very high, H = high, M = medium, L = low, VL = very low)

Ward	Exposure	Sensitivity		Capacity	Vulnerability		Risk	
	now	past	now	unchanged	past	now	now	2030
1	VH/H	VL	VL	VL	VH	VH	VH	VH
2	L/VL	H	L	M	H	M	L	L
3	M	L	M	M	L	M	L	L
4	VH/H	M	L	H	M	L	H	H
5	L/VL	VH	VH	VH	VL	VL	VL	VL
6	VH/H	H	H	L	H	H	M	M

budget to it in every ward. Farmer groups exist in every ward and have begun small financial operations.

The main gaps are related to access rather than awareness. Farmers understand that soil testing should be carried out before planting, but no ward has a soil-testing facility. Pest management is mostly reactive instead of preventive. Budget allocation remains limited, ranging from NPR 0.3 million to NPR 0.6 million of the total capital budget, without separate allocations for different agricultural subsectors. Government support for livestock has also decreased from NPR 2.5 million to NPR 0.5 million. National policy provides subsidies of up to 75% for crop and livestock insurance premiums and offers collateral-free concessional loans. However, very few farmers use these services because they lack information about the schemes and claim procedures. Infrastructure investments have also not been planned with climate resilience in mind.

Out-migration is reducing the agricultural workforce. In addition, **emissions from six brick kilns have reduced mango fruiting to such an extent that farmers may stop growing the crop.** If current trends continue, average annual agricultural production could decline by 30–50%.

5. The adaptation and risk-reduction plan

The plan is structured as a strategic framework and an activity schedule covering three priority areas and twelve priority programmes. Activities are classified as short-term (2075–2078 BS), medium-term (2075–2080 BS), long-term (2075–2085 BS), or continuous. Each activity identifies its location, lead organisation, and supporting agencies. The rural municipality serves as the lead organisation in all cases, while the main supporting agencies include the Agriculture Knowledge Centre, provincial ministries, cooperatives, the chamber of commerce, the Road Division Office, and the ministry responsible for forests and the environment.

The multi-criteria assessment identified similar priorities across all wards. These include deep tube wells or boreholes in each settlement. Canals, embankments, and diversion channels also need repair. Farmers need drought-tolerant and short-duration crop varieties. Seasonal soil testing, biological pest control, and pest-management training are also important. Other priorities include plastic-house and tunnel farming to protect crops from cold waves. Livestock

Table 3: Priority areas and programmes

Priority area	Priority programmes
1. Climate-smart agricultural governance, education and information	Climate-smart governance and agricultural education; information, communication and technology services, including a toll-free advisory line, farmer field schools, community extension centres and agro-weather bulletins
2. Increasing production under multi-hazard risk	Water source conservation and harvesting; irrigation rehabilitation and modern irrigation technology; tolerant seed and varieties; integrated pest and disease management; sustainable land management and youth employment; climate-adapted livestock practice and veterinary services; climate-adapted aquaculture; access to mechanisation; management of nilgai, wild boar and agriculture-friendly forestry
3. Climate-resilient infrastructure and enterprise promotion	Resilient structures from production collection centres through to markets, including storage, road upgrading, and municipal price and market regulation

need timely vaccination. Animal sheds and manure pits also need improvement. Farmers need better fodder, including berseem. Each ward should also have a livestock technician. The annexes identify specialised production areas. Ward 1 focuses on beekeeping. Ward 2 focuses on vegetables. Ward 3 focuses on poultry. Ward 4 focuses on paddy. Ward 5 focuses on fish, paddy, and wheat. Ward 6 focuses on fish farming.

6. Conclusion

The fieldwork shows that the agricultural sector in Suddhodhan Rural Municipality, Kapilvastu, faces several climate-related pressures. Drought is the main hazard. Its effects are worsened by pests and diseases, which can now affect crops for up to nine months each year. Cold waves have also shifted to a later period in the season. Crop raiding is another major problem and can destroy up to 70% of agricultural production in affected communities. The most important finding is that the adaptive capacity of these communities is not strong enough to address climate-related risks to agriculture. Their vulnerability results not only from exposure to hazards but also from limited access to trained technicians, improved seeds, mechanisation, and agricultural insurance.

These findings show what the plan must address. In Suddhodhan, the main problem is access rather than awareness. Farmers know that soil testing and livestock vaccination are important. However, no ward has a soil-testing facility. The use of subsidized insurance is also very low because farmers are not familiar with the procedures. Addressing these gaps will require better service delivery and a larger budget. Current investment in agriculture is low. The findings and proposed actions can support the rural municipality in preparing its annual agricultural programme and budget. The ward-level information on hazards, losses, and capacity gaps may also support planning by neighbouring local governments and district agencies in Kapilvastu. These areas share similar agro-ecological conditions and climate-related hazards.

The conclusions are subject to several limitations. Ward-level data were collected through

focus group discussions and represent average conditions within each ward. Production estimates may therefore change after more detailed measurement. The climate analysis is based on data from one weather station and gridded rainfall records. These data may not fully represent local microclimates. For this reason, the plan allows flexibility during implementation. The ten-year risk projection should be treated as an estimate rather than a precise forecast because local climate projections remain uncertain. These limitations do not change the overall direction of the findings. However, the plan should be treated as a flexible framework that is regularly updated based on experience and new evidence.

Some pictures during my fieldwork in Suddhodhan, Kapilvastu, Nepal

Figure 1: Facilitating farmers to make villages' resource map

Figure 2: Facilitating farmer's meeting

Figure 3: Preparation of crop calendar by farmers

Figure 4: Field inspection of farmer's livestock

Figure 5: Observation of irrigation canal in the municipality