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External review of the Small Irrigation Programme, phase II

Volume 1: main report (Final, 2 October 2024)

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Date:
2 October 2024

Evaluation period:
May – September 2024

Client:
Federal Department of Foreign Affairs
Swiss Agency for Development and Cooperation SDC
Swiss Cooperation Office Nepal

Front page photo credits:
The Blue Marble, Visible Earth, NASA

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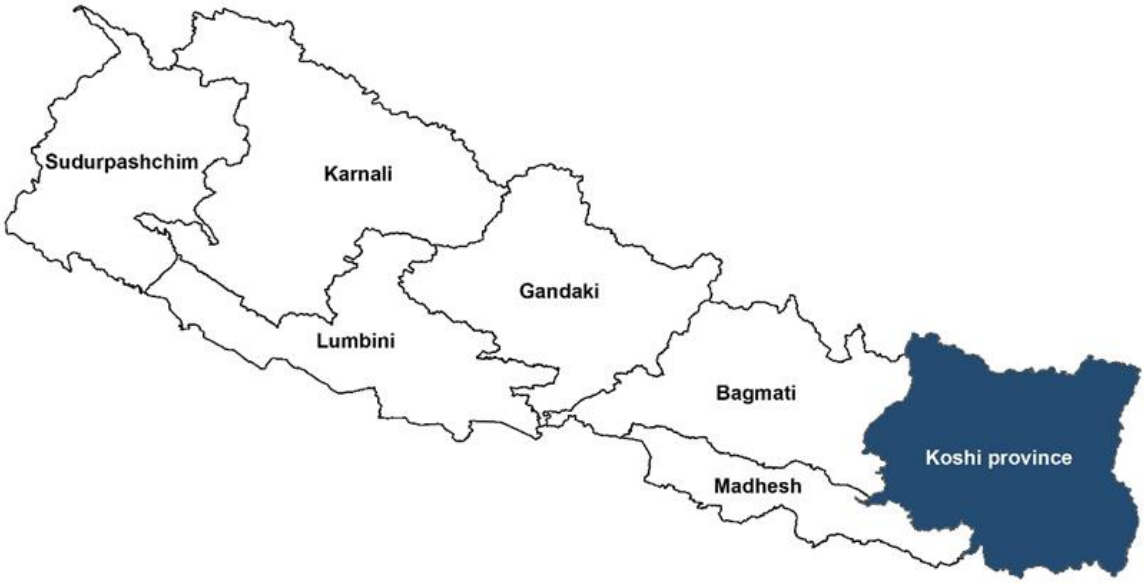
Nepal



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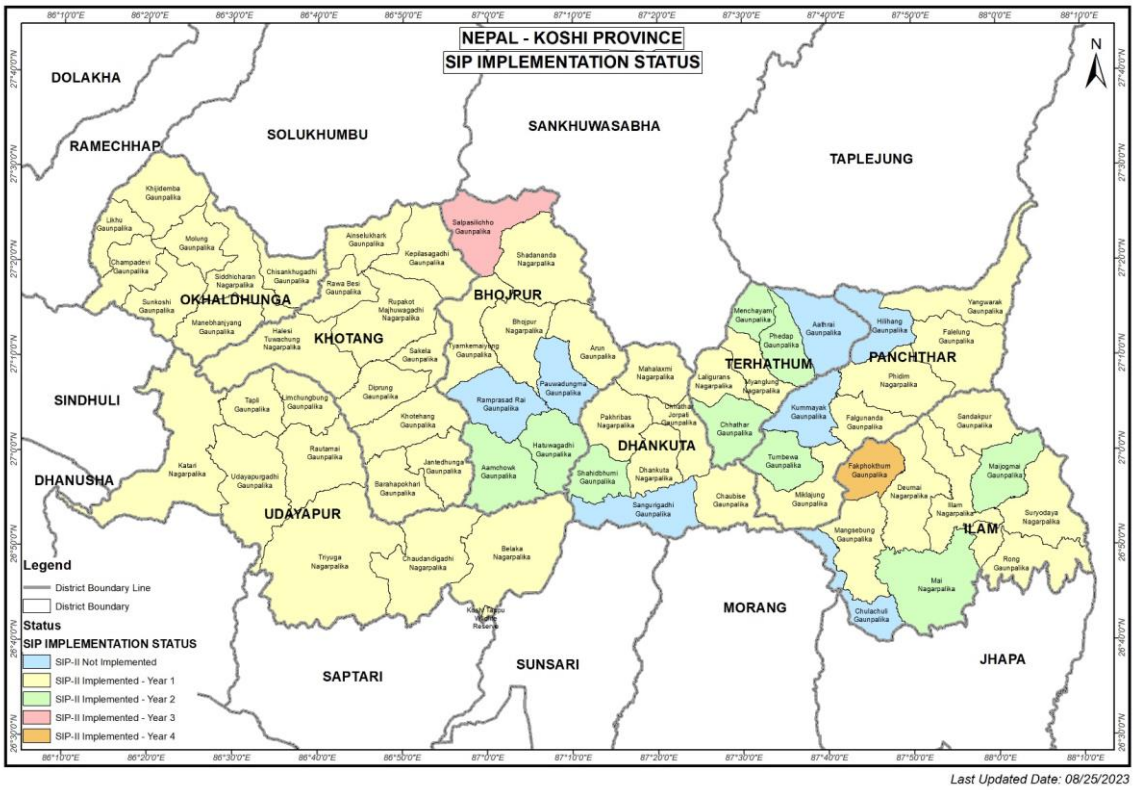

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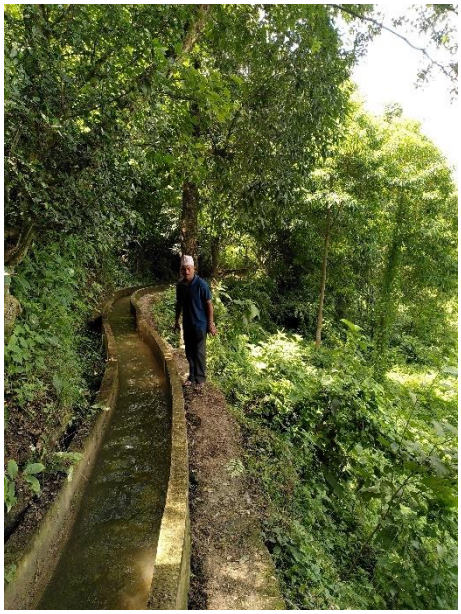


A canal

A distribution point

Abbreviations and acronyms

ADB	Asian Development Bank
CHF	Swiss franc
DAG	Disadvantaged groups
ha	hectare
LG	Local government
MoWSIE	Ministry of Water Supply, Irrigation, and Energy, Koshi Province, Nepal
NAMDP	Nepal Agricultural Market System Development Programme
NPR	Nepali Rupee
OECD/DAC	Organization for Economic Cooperation and Development/Development Assistance Committee
PAC	Programme Advisory Committee, SIP
PCC	Programme Coordination Committee, SIP
PIC	Programme Implementation Committee, SIP
SDC	Swiss Agency for Development and Cooperation
SIP	Small Irrigation Programme, Phase II, Nepal
SIS	Small Irrigation Schemes
WUA	Water user association

Executive summary

Purpose and use

This evaluation of the second phase of the Small Irrigation Programme (2020-25) was commissioned by the Swiss Agency for Development and Cooperation (SDC), represented by the Swiss Embassy in Nepal, in consultation with the Ministry of Water Supply, Irrigation, and Energy (MoWSIE) of Koshi province. The evaluation was to inform (i) the foci of the remaining nine months of programme implementation, (ii) how the provincial and local governments of Koshi province could continue rehabilitating small irrigation schemes after the programme, and (iii) the SDC's future work in Nepal on gender equality, social inclusion, and strengthening the federal system of government. The primary intended users were the programme consultant, the provincial and local governments of Koshi province, and the SDC.

Approach

The evaluation entailed a purposeful, theory-based, quantitative, and qualitative inquiry into the development effectiveness of the second phase of the Small Irrigation Programme. Purposeful, as it sought answers to the 10 evaluation questions of the SDC and the MoWSIE. Theory-based, because the evaluation took the programme's underlying theory of change as its point of reference. Quantitative, as it inquired amongst a representative sample of beneficiaries after the observed change in cropping intensity, land productivity, and income after the rehabilitation of the small irrigation schemes. Qualitative, because it relied on the insights from interviews and documents to understand the field observations and survey results and offer a descriptive analysis and assessment of the programme. The evaluation was conducted by an international development evaluator and two local agricultural (irrigation) specialists with the support from IOD Parc Nepal for the implementation of the field survey.

The Small Irrigation Programme

The Small Irrigation Programme was implemented by water user associations and local governments, with the (financial) support of the programme consultant, the MoWSIE, the Federal Department of Local Infrastructure, and the SDC. The primary goal was to provide year-round irrigation to 20,000 hectares (ha) of agricultural land in eight districts in the mid-hills of Koshi Province, providing 48,000 households with additional income, including 40% from disadvantaged groups. The secondary objective was to establish a good practice on promoting sectoral development within Nepal's nascent federal structure of government.

The programme sought to achieve these goals through (i) technical assistance and funding for the identification, selection, design, and construction of 1,300 small irrigation schemes in 59 municipalities, (ii) technical assistance to the water user associations on running an association, the optimal use of irrigation, and the production and marketing of agricultural produce (including higher value crops like vegetables), and (iii) codifying the programme's practice in a Small Irrigation Guideline and an online Design and Project Preparation Report System for the future perusal of the provincial and local governments of Koshi province.

On agricultural development

The Small Irrigation Programme allowed water user association to build solid, no frills, irrigation schemes which provided their members with year-round irrigation. This enabled the smallholder farmers to increase their cropping intensity and land productivity, introduce new (vegetable) crops, raise their production (both for home consumption and the market), improve their income and livelihoods, and—importantly—send their children to better (private) boarding schools. The investments were cost-effective (when compared to industry standards) and resulted in a benefit-to-cost ratio between 3 and 4, meaning that for every Swiss franc invested, the smallholder farmers gained three to four Swiss francs. As such, the programme

was relevant, effective, impactful, and efficient. (Note: the quantitative results of this evaluation are to be considered tentative as they are based on production and income data from a single field survey.)

The programme spent only 0,6% of its budget on training to the water user associations and smallholder farmers. These training courses, whilst useful, were considered too general and did not reach all smallholder farmers. Importantly, smallholder farmers were left with specific questions about irrigation patterns, cultivation practices, and pest control in vegetable production. Neither the local governments nor the market could fill the gap (and answer these questions). As such, the programme did not exploit the full potential of combining year-round irrigation with the introduction or good agricultural practices.

Moreover, the results and benefits are likely to have a time-limited horizon. For two reasons. First, the farmers do not operate and invest in their farms as commercial, growth-oriented, businesses. Instead, they see agriculture as the proverbial cash cow to provide their children a future outside agriculture. Second, current agriculture practices do not generate enough turnover to maintain the schemes and repair damage from (ubiquitous) rubble and landslides.

Outward migration and the resultant shortage of agricultural labor offers the opportunity for the provincial and federal government (with the SDC?) to revisit Nepal's land use policy, foster land consolidation, and promote the *'modernization, mechanization, and industrialization of agriculture ... and transforming Nepal's agricultural sector into a competitive, ... market-driven, ... [and] consumer- and export-oriented industry'*. Given Nepal's topography, small irrigation schemes will be needed therein. This could make the small irrigation schemes both more relevant from a federal policy perspective and put them on a more sustainable footing.

On federal state building

The Small Irrigation Programme was structured along the intent and principles of the 2015 Constitution and the realities of Nepal's political and fiscal decentralization. The identification, selection, and supervision of investments in small irrigation schemes was given to the local governments (as per Constitution). The provincial and federal government were nonetheless involved out of need for funding and to give meaning to the constitutional principle of *'cooperation, co-existence and coordination'* between the three spheres of government.

Provincial and local government staff were involved in the selection of schemes and supervision of construction. The programme, however, missed the opportunity to build provincial and local government staff capacity in project management, detailed scheme design, and the operation of the programme's design and project preparation support system. This undermined the replicability of the programme and prevented provincial and local government staff to build new and requisite capacities. It is such capacities which will ultimately allow the provincial and local governments to exert their constitutional rights. The programme consultant's coordinating role is, in the future, best taken up by the provincial government, supplemented by market expertise.

On gender equality and social inclusion

The programme ensured upfront the participation of women and representatives from disadvantaged groups. It met its formal targets to this end and, as such, can be considered 'GESI-positive'. Importantly, some women gained access to business opportunities stemming from the cultivation of vegetables, and voice/agency through their participation in the executive committee of the water user association. Representatives from discriminated groups who were members of the executive committee of water user associations felt equal and heard. The programme, however, did not keep tabs on possible (emerging) intra-group inequalities,

stemming from the fact that not all could participate in the executive committees, had access to income opportunities, or because they had marginal landholdings.

On governance and steering

The federal, provincial, and local governments were represented in the governance structures of the programme. This offered a conduit for *'sharing information'* between the three spheres of government on agricultural irrigation in Koshi province. The government representatives also asked pertinent questions about the replication of the programme, the capacity building of government, and the provision of agricultural extension services to smallholder farmers. These questions were generally not followed up with dialogue, answers, decisions, and actions. This raised the question whether the programme's governance committees were sufficiently, explicitly, and ongoingly empowered to think and act strategically and steer the programme accordingly.

In a similar vein, the programme was largely implemented by the book and, from a project management perspective, well. This ensured that the programme was able to deliver on some of its key outcome objectives on agricultural irrigation and production. But it did not achieve all its targets and the programme's results matrix gave early signs to this end. The protagonists did not, to any significant degree, adapt the programme accordingly. As above, could the programme consultant have used the feedback it received for programme steering? Probably.

Recommendations

Given the three-fold purpose of the review, the review recommends:

- for **the remaining nine months of implementation**, for **the programme consultant** (with the endorsement of the SDC Nepal) to:
  - complete the construction of the planned small irrigation schemes,
  - include provincial and local government staff in the design and implementation teams,
  - advise which agricultural extension services model is most promising in Nepal.
- for **after the Small Irrigation Programme**, for **the provincial government** to:
  - replicate the Small Irrigation Programme as a provincial government programme.
- **the SDC Nepal**, to:
  - to continue its affirmative action approach in selecting beneficiaries and complement it—during project implementation—with an anthropological study to determine and, if needed, respond to intra-group dynamics, impacts, and opportunities, and
  - to require implementing agencies to include government staff as full team members in project implementation to build the requisite capacities 'on-the-job' for exerting their constitutional rights and roles.

Summary assessment OECD-DAC evaluation criteria

Goal	Smallholder farmers, especially from the disadvantaged groups, reduce their poverty by increasing their agricultural income								
Impact									
Stakeholders	Smallholder farmers		Local governments		Provincial government		Federal government		SDC
Relevance									
Outcome statements	Outcome 1: Local Governments respond effectively to the needs of small farmers for irrigated agriculture			Outcome 2: Small farmers especially from DAGs increase agricultural productivity					Outcome 3: Market actors offer innovative supports and products to farmers in irrigated schemes
Outputs	Provincial government strengthens capacity to support local governments	Local governments strengthen capacity to implement small irrigation schemes	Local governments provide agricultural extension services to smallholders	Smallholder farmers organize in water user associations	Water user associations rehabilitate small irrigation schemes	Water user associations establish O&M systems	Smallholder farmers access agricultural extension services	Water user associations plan production based on market opportunities	Smallholder farmers sell their products to the market
Effectiveness									
Sustainability									
Efficiency									

*Note: This table was included upon SDC Nepal's request. A similar table was part of the self-evaluation report of the Small Irrigation Programme (SIP, 2023c). The color-coding is based on the evaluation's assessment of the OECD/DAC evaluation criteria (see Appendix SDC's assessment grid).
Legend: color coding based on traffic light system – green = achieved, orange = partly achieved, red = not achieved.

1 Introduction

1. This report documents the external review of the second phase of the Small Irrigation Programme (SIP) in Koshi province, Nepal. This review was conducted between May and September 2024. At the end of the review, there remained nine months to complete the implementation of the Small Irrigation Programme which, by that time, will have run five years: from 1 July 2020 until 15 July 2025. This opening chapter lays down the purpose and intended use of the review, describes the Small Irrigation Programme, introduces the review methodology and its limitations, and offers a reading guide to the rest of the report.

1.1. Purpose and intended use

2. The review was commissioned by the Swiss Agency for Development and Cooperation (SDC), in close coordination with the Ministry of Water Supply, Irrigation and Energy (MoWSIE) of Koshi province. The review was to account for, and understand, the preliminary results of the second phase of the Small Irrigation Programme. As such, the review was to ascertain whether the programme was *'on track'* to achieve its outcome and impact targets, and, in that regard, to draw lessons on *'what worked, what didn't and why'*.

3. The purpose of the review was thereby to:
- inform where to spend the programme's energy and resources on in the remaining nine months of implementation,
- guide the provincial and local governments of Koshi province in how best to continue the rehabilitation of small irrigation schemes after the completion of the Small Irrigation Programme, and
- draw lessons for the SDC on how best to:
  - support the implementation of Nepal's Constitution—and its introduction of a federal system of government—within specific socio-economic sectors, and
  - continue to target poverty reduction, gender equality and social inclusion within an overall project portfolio which has shifted from a *'direct targeting'* approach towards influencing the socio-economic *'framework conditions'* of development.

4. The primary intended users of the review, therefore, were the Programme Advisory Committee (PAC), the Programme Coordination Committee (PCC), and the Programme Management Implementation Support Consultant (programme consultant) of the Small Irrigation Programme, as well as the Ministry of Water Supply, Irrigation and Energy of Koshi province, the local governments of Koshi province, and the SDC.

1.2. The Small Irrigation Programme

5. **Partners and budget**. The Small Irrigation Programme was implemented by water user associations and local governments, with the support of the federal Department of Local Infrastructure, the Ministry of Water Supply, Irrigation and Energy of Koshi province, the programme consultant, and the SDC, with financial contributions from all actors (see Table 1).

Table 1 SIP budget and funding sources

	Total	Federal government	Provincial government	Local government	Water user associations*	SDC
Programme costs	**CHF 49.5M**	CHF 8.86M **(18%)**	CHF 8.96M **(18%)**	CHF 9.66M **(19%)**	CHF 4.8M **(9%)**	CHF 17.6M **(36%)**
Construction costs	**CHF 43.9M**	CHF 8.76M (20%)	CHF 8.76M (20%)	CHF 8.76M (20%)	CHF 4.38M (10%)	CHF 13.2M (30%)
Technical assistance	**CHF 4.4M**					CHF 4.4M (100%)
Programme management	**CHF 1.2M**	CHF 0.1M (8%)	CHF 0.2M (17%)	CHF 0.9M (75%)		

* The contributions from the water user associations were mostly labor for constructing the irrigation canals. Source: (SDC, 2020)

6. **Scope and objective**. The immediate goal of the Small Irrigation Programme was to provide year-round irrigation for 20,000 hectares (ha) of agricultural land in eight districts in the mid-hills of Koshi Province (see maps in the front matter). This was to be achieved by helping construct or rehabilitate around 1,300 small irrigation schemes, which were to enable around 48,000 households, including 40% from disadvantaged groups, to increase their agricultural income—on average—by 100%.[1] The secondary objective of the programme was to establish a good practice on promoting sectoral development within Nepal's nascent federal structure of government, which could be replicated in other sectors.

7. **Strategy**. The Small Irrigation Programme sought to achieve this dual objective through:
   - technical assistance and funding for the identification, selection, design, and construction of the around 1,300 small irrigation schemes in 59 local governments in Koshi province, with the construction being done by the beneficiaries (i.e., the smallholder farmers, organized in water user associations), supervision by the local government engineers, and technical assistance offered by the programme consultant,
   - technical assistance to the water user associations on running a formal association and the optimal use of the irrigation schemes, including on irrigation management, post-harvest practices, and the production of vegetables (a higher value-crop than the paddy, wheat and maize, generally cultivated in the mid-hills of Koshi Province),
   - a collaboration with the SDC funded Nepal Agricultural Market System Development Programme (NAMDP) to facilitate meetings between water user associations and traders and work with traders to directly offtake vegetable produce from the supported water user associations, as well as by making available market price information to the smallholder farmers from the water user associations, and
   - codifying the Small Irrigation Programme practice in a Small Irrigation Guideline and an online Design and Project Preparation Report System for the future perusal of the provincial and local governments of Koshi province, as well as elsewhere in Nepal.

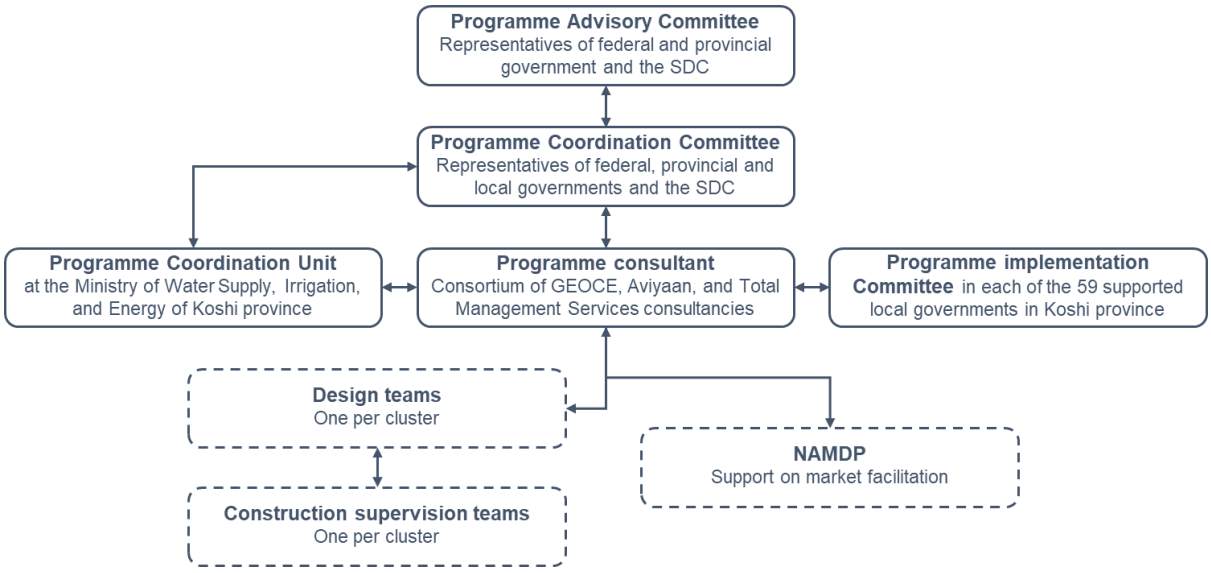
8. **Organization**. The programme's governance and organizational set-up are shown in Figure 1. The programme's center of gravity lay with the programme consultant which, at the time of the review, compromised 84 staff (72 in regular project-based employment and 12 on short-term contracts). 18 staff were in the programme office in Biratnagar, 66 staff were spread over the five cluster offices, covering the eight targeted districts. Two staff were seconded for three days a week from NAMDP. The programme consultant was governed by the Programme Coordination Committee—co-chaired by the Minister of Water Supply, Irrigation, and Energy of Koshi province and the Swiss Ambassador, and advised by the Programme Advisory Committee—co-chaired by the Secretary of the federal Department of Local Infrastructure and the Swiss Ambassador.

1.3. The review methodology

9. The review concerned a purposeful, theory-based, qualitative, and quantitative inquiry into the development effectiveness of the second phase of the Small Irrigation Programme.
   - Purposeful, because the review sought answers to the evaluation questions of the SDC and the Ministry of Water Supply, Irrigation and Energy of Koshi province,
   - theory-based, because the review took the programme's theory of change as a starting point for its inquiry and subsequent data analysis,

[1] The original aim was to reach around 65,000 households. This was based on an assumed average landholding of 0.31 ha, i.e., 20,000 ha divided by 0,31 ha. The programme's monitoring data evidenced that the average landholding was 0,42 ha (SIP, 2024). As the amount of land to be irrigated was set (at 20,000 ha) and the number of households to be reached was derived from this figure, the review adjusted the target for household beneficiaries downward, i.e., 20,000 ha / 0,42 ha, gives 48,000 households.

Figure 1 The governance and organization of the Small Irrigation Programme, phase II



- qualitative, as the evaluation relied on the insights and perspectives from individual and group interviews and documentation to offer a descriptive analysis and assessment of the programme's results, and
- quantitative, because the review commissioned a field survey amongst a representative sample of smallholders—conducted by IOD Parc Nepal—to collect quantitative data on the programme's impact and outcome indicators.

10. This report's findings stem from a combination of inductive, deductive, contribution, and comparative analyses and have been triangulated across data sources and evaluators.

1.4. Limitations

11. The review rests on a comprehensive data set[2]. Still, some caution is warranted in interpreting the collected data. For four reasons.

- The field survey collected agricultural income data from before the rehabilitation of the small irrigation schemes and from the last three growth seasons (which coincided with the last fiscal year). The smallholder farmers observed, time-and-again, that their income depends on—and fluctuates with—the prevailing weather conditions and market prices. As the reported income gains stem solely from a comparison of last year's income with the income enjoyed prior to the rehabilitation of the irrigation schemes, the field survey offers at best a snapshot of the income gains made. We do not know if last year's income data offers a fair reflection of smallholders' annual income over multiple years. This makes it risky to extrapolate the income gains into future years.
- The field survey was conducted amongst a random sample of small irrigation schemes and smallholder farmers. The sample population, whilst representative, differed from the baseline study population (Q4D, 2022). Some of the absolute numbers (e.g., on the average income from land cultivation) differed markedly between the baseline study and survey. The field survey data also included erroneous data entries.[3] Whilst we

[2] The review entailed a document review, 42 interviews, field observations, and an impact survey of 501 smallholder farmers.
[3] This especially emerged when comparing production and sales figures (with individual respondents selling crops that they did not produce or not at these quantities) and comparing sales figures and income data (with ostensibly different number of farmers selling to the market and earning cash income). These data entries were partly corrected but raise questions about how well the enumerators entered the data in the survey software (Kobo Toolbox) and the data cleaning (process) afterwards.

concentrate in the analysis of the field survey data on a 'before-after' analysis based on the data collected within the survey, these observations also give pause.

- The gender equality and social inclusion analysis is based on a relatively small number of (group) interviews with women and representatives from ethnic minorities. In development cooperation, these groups are often treated as homogenous groups, which they are not. Beneficiaries have different amounts of landholdings, and women belong to different ethnic groups and castes, leading to different experiences / results.
- The field mission visited 7 small irrigation schemes which, whilst located in four different districts, were relatively well-positioned for vegetable production in the winter and spring seasons. As such, they were not fully representative of the programme's full portfolio of schemes. This showed up in differences in the reported results between the field mission, field survey, and the programme's own outcome monitoring. This report highlights where such differences exist. Still, the review's qualitative data and understanding about what worked, what didn't and why naturally stem from the field mission. As such, the review may carry some bias based on the seven visited schemes.

12. At the end of the day, the review constituted a probe, based on a limited data set, offering one reality of the programme. Individual actors submerged in programme components may have experienced a different reality and hold a (somewhat) different picture of the programme, the results it fostered, and the lessons it bears. Such differences in experiences and perceptions are natural and unavoidable. They offer the opportunity to complement and enrich each other. This review therefore offers but one building block for future decision-making. The stakeholders' own experiences provide additional input.

1.5. Reading guide

13. The subsequent chapters answer the main evaluation questions. The chapters are organized along the OECD/DAC evaluation criteria. Chapter 2 reviews the relevance of the Small Irrigation Programme, i.e., the extent to which the programme was aligned with the policies and priorities of the programme sponsors and beneficiaries, and continued to do so when circumstances changed. Chapter 3 turns to the heart of the matter by assessing and analyzing the development effectiveness of the Small Irrigation Programme, as measured by the OECD/DAC evaluation criteria effectiveness, impact, and sustainability. The chapter reviews results achievement of both the programme's primary objective (increased agricultural income for smallholder farmers), and secondary objective (embedding the federal system of government in the governance and steering of the agricultural irrigation sector). Chapter 3 also looks into the gender equality and social inclusion aspects of the programme and possible impacts of climate change, as these can qualify and/or effect the results achieved.

14. Chapter 4 analyzes the cost-effectiveness of the Small Irrigation Programme by comparing the cost-per-beneficiary with similar interventions from other development partners. It also offers a benefit-cost analysis of the programme, and a reflection on the timely delivery of the results and the programme governance and steering. Chapter 5 draws an overall conclusion and distills lessons. Chapter 6 contains the review's recommendations for the programme consultant (for the remainder of the programme), the provincial and local governments (for continuing the rehabilitation of small irrigation schemes), and the SDC (on social targeting and federal state building). The standard SDC assessment grid on the OECD/DAC evaluation criteria is included as an appendix. Further details on approach, methods, results, and data sources are included in a second volume of the report (see Table of Content).

2 Relevance

Evaluation questions

To what extent was SIP II aligned with the needs, demands, policies, and priorities of the recipient country, target groups, and Switzerland, and how did it respond to changes in the political economic context?

2.1. Introduction

15. This chapter's lead evaluation question entails two dimensions: the extent to which the programme is relevant for the stakeholders involved in the programme, and how the programme responded to changes in the development context and maintained its relevance in the process. This chapter will cover each dimension in turn.

16. When evaluating the relevance of development programmes, it is key to differentiate between 'policies' and 'priorities', i.e., between the stated objectives and the stakeholders' actual actions and lived experience. A country or organization can have policies that are not implemented and pursue priorities without policies. At the end of the day, it are the stakeholders' consistent actions and how well the programme is embedded in those actions—however humble—that signal relevance. This chapter, therefore, will look at both the policies and actions of the key stakeholders.

2.2. Relevance for the primary stakeholders

2.2.1 The beneficiaries

17. The small irrigation schemes are for the benefit of smallholder farmers in the mid-hills of Koshi province. Key informants described these smallholder farmers as *'marginalized and economically deprived'*. They rely on agriculture to subsist, earn an income, and allow their children a (better) education. Water is a necessary input for cultivating crops. The small irrigation schemes allow water to be available year-round. It gives smallholder farmers the much-needed opportunity to improve their subsistence, income, and livelihoods. The smallholder farmers responded accordingly to the opportunity provided by the Small Irrigation Programme. They proposed, self-constructed[4], and maintained the irrigation schemes. In other words, the smallholder farmers had a need for more irrigation and took action to secure it, i.e., the Small Irrigation Programme was relevant for the smallholder farmers.

2.2.2 Local governments

18. The promotion of local economic development is in Nepal the responsibility of local governments. The four local governments visited during the field mission all prioritized agriculture and tried to help increase agricultural *'productivity and production'* through the (subsidized) provision of irrigation, seeds, fertilizer, and equipment like mini-tillers and plastic tunnels for vegetable production. They spent between 5% to 10% of their investment budget on promoting irrigation[5] and a similar sum on agricultural development. For the four local governments, it ranked among the top five priorities (after education, health, social services, and physical infrastructure). Presuming that these four local governments (which encompassed urban and rural municipalities) are representative for all local governments in

[4] The small irrigation schemes were fully constructed by the smallholder farmers benefiting from the irrigation schemes. They contributed 10% of the construction costs in labor, and 1% in cash as an upfront payment to the mandatory operations and maintenance fund. Labor inputs which exceeded the 10% of the construction costs were paid out in wages. The review did not assess whether this wage compensation was necessary. Material inputs were funded by the government and the SDC; technical assistance by the SDC.

[5] This appeared to be the local government contribution to the Small Irrigation Programme; the local governments did not invest in agricultural irrigation over and above this contribution.

the mid-hills of Koshi province (whose economy primarily relies on agriculture), and noting that they acted on their priorities, the programme was clearly relevant for local governments.

2.2.3 Provincial government

19. In the first Periodic Plan of Koshi province (2019/20-2023/24), the provincial government aimed to increase the amount of agricultural land under year-round irrigation by 43,000 hectares, including through the community-based rehabilitation and modernization of existing irrigations systems (MoEAP, 2022). As such, it wanted to strengthen the reliable availability of water for agriculture and its resilience against climate change. The Small Irrigation Programme is set to contribute over 20,000 hectares (see Chapter 3) or close to half this amount. Moreover, the Ministry of Water Supply, Irrigation, and Energy of Koshi province has an annual budget of around NPR 1.5 billion (equivalent to CHF 9.5 million) for constructing, rehabilitating, and repairing irrigation schemes. The Ministry shared with the review team that roughly 75% of this budget goes to small irrigation schemes, and that of the 2,000 irrigation schemes supported in 2023-24, roughly 50% were small scale. Through this budget line, it also contributes 20% of the construction costs of all schemes built under the Small Irrigation Programme. As the provincial government combines policy with action, the Small Irrigation Programme is also relevant for the provincial government of Koshi province.[6]

2.2.4 Federal government

20. The 15th National Plan of the Government of Nepal (2019/20-2023/24) lays down a long-term vision for the country until 2043. It makes ample reference to agricultural development and agricultural irrigation. Irrigation is seen as essential to increase agricultural productivity. The plan sets the goal to *'provide sustainable and reliable irrigation of arable land [through] the rapid and intense expansion or irrigation facilities'* (NPC, 2020). In line with this goal, it also funded 20% of the construction costs of all schemes built under the Small Irrigation Programme. The plan also suggests the need to *'mobilize investments from the local level for small irrigation projects'* which is in line with the local governments' constitutional mandate for small scale irrigation (NPC, 2020).

21. Having said that, the 15th National Plan also foresees the *'transformation of the agricultural sector into a competitive, climate resilient, self-reliant, and export-oriented industry ... through the development of scientific, commercial, market-driven, and consumer-oriented agricultural practices ..., the modernization, mechanization, and industrialization of agriculture, ... [and] effective implementation of land use policy, land consolidation and land pulling'* (NPC, 2020). To that end, the government *'prioritizes big multi-purpose, inter-watershed, and reservoir-based projects for year-round irrigation'* (NPC, 2020). To what extent the government is indeed committed to this vision is not fully clear (Engelsman, Bahadur KC, & Nepal, 2023) and to what extent small scale irrigation is relevant for this vision equally so. Overall, we conclude that the Small Irrigation Programme is relevant for the federal government, but not to the same degree as for the other above stakeholders.

2.2.5 The SDC

22. The Small Irrigation Programme is to *'boost the agricultural income of small-scale and disadvantaged farmers'* (SDC, 2020). As such, it is to directly contribute to the second objective statement of the Swiss Cooperation Programme Nepal 2023-26 *'women & men, including from disadvantaged groups, find employment and increase their income',* and two of

[6] Section 3.4 takes up the role of the different spheres of government in agricultural irrigation.

its outcome indicators[7] (SDC, 2022). Having said that, *'Switzerland has shifted its strategic focus away from livelihood interventions and towards economic development more broadly, with an emphasis on market development, infrastructure, and technical and vocational education and training ... supporting the delivery of public goods'* (SDC, 2022). As the Small Irrigation Programme stems from the SDC's livelihood improvement days, for the current Cooperation Programme, the Small Irrigation Programme may be more relevant for Switzerland's other major goal over the last years, namely to further accompany the implementation of the 2015 Constitution and strengthen the federal system of government[8]. The Small Irrigation Programme offered an opportunity and instrument to undergird the federalization process *'by establishing a favorable institutional set-up, fund flows, implementation arrangements, and steering mechanisms'* (SDC, 2024). To what extent the Small Irrigation Programme has succeeded in this regard is the subject of the next chapter. Here, it suffices to say that the Small Irrigation Programme was and remained relevant for the SDC Nepal. Finally, a link with Switzerland's International Cooperation Strategy is also easily made as through its federal state building and agricultural income support, the programme contributed to Switzerland's overall goals of sustainable peace, good governance, and inclusive development (FDFA, 2021).

2.3. Responsiveness to change

23. There were not necessarily major changes in the development context of the Small Irrigation Programme, but the political-economic context did throw a few challenges at the programme. Three stand out. In all three instances, the programme responded appropriately, with a combination of necessary acceptance, flexibility, and perseverance. First, the political context in Nepal is highly fragile. There is no strong parliamentary majority. Instead, there are severe inter-party power struggles, fragile and shifting political alliances, and frequent changes in government. These permeate down to the provincial level. Koshi province has seen five different governments between November 2022 and August 2024, and the rotation in the provincial and local governments of federal appointed staff is frequent. The programme's federal and provincial governments' counterparts therefore changed frequently and decision-making (for example on the Small Irrigation Guidelines) was slow. Accordingly, the programme had to reinvest in relationship building and decision-making time-and-time again.

24. Second, the Covid-19 pandemic restricted movement, delayed implementation, and simply required additional time (which the programme received) to meet the programme goals. Third, the federal government faced fiscal challenges in 2023-24 and reduced budget allocations to the provincial and local governments. The provincial government could therefore temporarily not meet its programme obligations. Here, the Programme Coordination Committee stepped in and secured the necessary budget allocations from the federal government to Koshi province. This delayed 70 small irrigation schemes, which had to be carried over to the next fiscal year. None of these challenges changed the above-stated relevance of the programme.

2.4. Conclusion

25. This chapter's analysis evidenced that the Small Irrigation Programme is, and continued to be, aligned with the needs, policies, and priorities of the recipient country, target groups, and Switzerland. The next chapter dives into the question whether the programme was also effective in meeting these needs and priorities.

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[7] These are indicator 2.1.2 (effective implementation of reforms by local, provincial, and federal governments) through the adoption and implementation of the Small Irrigation Guideline by local governments, and indicator 2.3.3 (improvement in productivity) through increased agricultural land productivity (for the crops paddy, wheat, and maize).
[8] See Section 3.4.1 for a brief background to this goal.

3 Effectiveness, impact and sustainability

Evaluation questions

To what extent have the intended impacts and outcomes of the programme been achieved or are likely to be achieved by the end of the phase (both on paper and on-the-ground) and how has the SIP contributed to the realized impacts and outcomes (including what worked, what didn't, and why)? To what extent are the net benefits of the intervention likely to continue after the project end? Is federalization of irrigation moving in the right direction (in terms of the execution of the constitutional mandates on agricultural irrigation, the requisite policy framework, and institutional capacity and capability)? Should the endorsement of the Federal Civil Services Act have been a conditionality before the start of the phase? How effective was the mainstreaming of gender equality and social inclusion in the programme institutions, implementation, outcomes, and impacts? How effectively were the environmental and climate change considerations taken up in the irrigation system construction?

3.1. Introduction

26. This chapter turns to the programme results. It starts by assessing and analyzing the extent to which the programme has contributed to its primary objective, namely, to increase the agricultural income of the beneficiaries of the small irrigation schemes. This analysis also incorporates the risks posed by climate change and landslides. We subsequently reflect on the extent to which the programme supported gender equality and social inclusion. We then turn to the programme's secondary objective to embed the federal system of government in the governance and steering of the agricultural irrigation sector. At the chapter's end, we draw an evaluative conclusion on the programme's likely effectiveness, impact, and sustainability.

3.2. Irrigation, cropping intensity, productivity, production, income, and landslides

27. In this section, we conduct a contribution analysis—a structured inquiry into the extent to which the Small Irrigation Programme contributed to gains in agricultural income amongst the programme beneficiaries. We begin by restating the numerical goals of the programme and how the programme sought to achieve these (the theory of change). We subsequently share the observed progress in irrigation, cropping intensity, productivity, production, and income, as well as the extent to which the programme activities have been undertaken, the feedback from the beneficiaries, and consider whether other (external) factors could have contributed to the observed results, before drawing an evaluative conclusion on the contribution of the Small Irrigation Programme to these results.

3.2.1 The goal

28. The overall objective of the Small Irrigation Programme was *'to combat poverty by boosting the agricultural income of small-scale and disadvantaged farmers'* (SDC, 2020). The programme's results framework quantified this objective—the programme sought to assist 48,000 households[1] to, on average, increase their income:

- from the sale of agricultural products by 75%, and
- from agriculture, livestock, and fisheries by 100%.

Moreover, 40% of the beneficiary households should be from disadvantaged groups[9]. The income increase was to reduce the poverty incidence in the eight targeted districts of Koshi province from 20% to 16%.[10]

[9] Disadvantaged groups are groups of people which are (i) discriminated upon based on ethnicity, caste, or gender, and (ii) are economically disadvantaged/poor (earning less than US$ 2 per day) and/or suffer food insufficiency (food sufficiency less than six months from the command area of the proposed irrigation scheme) (SIP, 2020; Innovative Circle, 2022).

[10] This indicator *'monitors the overall economic status of the people in Koshi province. The project will not collect data for this indicator but rely on ... [periodic measurements of Nepal's] National Planning Commission through its Multidimensional Poverty Index'* (SIP, 2020).

3.2.2 The underlying theory of change

29. The programme sought to achieve the above goal by assisting the 48,000 households to gain access to reliable and sufficient year-round irrigation. This was to be done by rehabilitating and modernizing existing (leaky) irrigation schemes.[11] This would ensure that water is available year-round for irrigation, which would allow the smallholder farmers to increase the cropping intensity[12], raise land productivity[13], and produce more for the market (offering additional cash income). To secure this increase in cropping intensity, land productivity, and agricultural income, the smallholder farmers were:

- organized in water user associations to manage, maintain, and repair the small irrigation schemes,
- offered training on irrigation and organizational management, post-harvest practices, and the cultivation of (higher value) vegetables, and
- through the collaboration with NAMDP, connected to traders, specialized in the agricultural inputs for the cultivation of vegetables and—importantly—their marketing.

30. Finally, the smallholder farmers were expected to reinvest income gains into expanding their agricultural production further, as well as in their livestock and fisheries holdings, thereby also raising their overall agricultural income (i.e., the income earned from agriculture, livestock, and fisheries). The full theory of change is included in Appendix C, volume II.

3.2.3 The observed results

31. Table 2 captures the observed results from the programme's own monitoring data, our field observations, and the impact survey. The programme's own monitoring data shows that the programme is on track to putting 20,000 hectares of agricultural land under year-round irrigation, benefiting over 48,000 households. After four (of the five) years of implementation 18,227 hectares have year-round irrigation, benefiting 44,878 households, 45% of which are from disadvantaged groups.

32. During the field mission, smallholder farmers consistently confirmed that the rehabilitated irrigation schemes provided them sufficient and reliable water to cultivate (most of) their land for three seasons per year (with an increase in cropping intensity of up to 100%) and that they enjoyed higher yields (with an increase in land productivity of 20-30%), and that this allowed them to sell more to the local and/or regional market, increasing their income. Their estimates on the income increase varied significantly and fell in the range of 20% to 100%. These qualitative findings roughly match the programme's own monitoring data which found an average increase in cropping intensity of 39% and in land productivity of 45%[14] (SIP, 2024).

33. As said, apart from the qualitative field observations, we also conducted an impact survey. Chapter 1 already emphasized that this field survey should be interpreted cautiously, if only because it represents a single snapshot. Having said that, the field survey consciously inquired after the situation before and after the rehabilitation of the small irrigation schemes (thus allowing for a before-after analysis).

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[11] The focus was on rehabilitating existing irrigation schemes. As several informants quipped *'the land that could be irrigated in Nepal, had been irrigated'*. The challenge was that most of the existing irrigation schemes were decades old, stemming *'from grandfather's time'*, with earthen linings which, due to breeches and leakages, did not bring water to the land, year-round. Of the 1074 schemes built after four years, only 6 constituted *'new'* irrigation schemes, the rest were *'rehabilitated'*.

[12] Cropping intensity is the number of times per year that the land is cultivated. Koshi province in Nepal has three grow seasons: monsoon, winter, and spring. Year-round irrigation allows the farmers to cultivate (more) agricultural land during the (relatively) dry winter and spring seasons. The Small Irrigation Programme defined year-round irrigation as allowing for the cultivation of 95% of the agricultural land during the monsoon season, 80% during the winter season, and 35% during the spring season (SIP, 2022). Cumulatively, this amounts to a cropping intensity of 210% (with 300% being the theoretical maximum).

[13] Sufficient and reliable water availability is critical for plants to extract and absorb nutrients from the soil (such as nitrogen, phosphorus, and potassium). Irrigation is sought to boost land productivity by 25-30% (SDC, 2020).

[14] This is the weighted average recorded increase in productivity in paddy, wheat, and maize cultivation (author's calculation).

Table 2 Small Irrigation Programme results framework (impacts and outcomes)

Indicator	Baseline value	Target value	OMS[1]	Field mission	Field survey
Impact: Small Farmers, especially from the disadvantaged groups (DAGs) reduce their poverty by increasing their agricultural income					
Average agriculture income from agriculture, livestock, and fisheries increases by 100%	NPR 72,666	NPR 145,332	n/a	No additional increase	+64%
Average income from sale of agriculture products increases by 75%	NPR 25,044	NPR 43,827	n/a	+20% to 100%	+30%
Overall poverty in programme intervention areas reduce by 20%	20%	16%	n/a	15,9%	n/a
Outcome 1: Local Governments respond effectively to the needs of small farmers for irrigated agriculture					
100% LGs have adopted the Small Irrigation Guideline for identification / budgeting / implementation / monitoring / support of irrigation schemes	0%	100%	100%	100%	n/a
20,000 hectares increase in additional area under year-round irrigation in participating LGs	0	20,000 ha	18,227 (after 4 of 5 years)	n/a	n/a
100% schemes have received at least one visit of a rural advisory services provider during the production cycle	15%	100%	67% (717 of 1074 schemes)	n/a	n/a
Outcome 2: Small farmers especially from DAGs increase agricultural productivity					
48,000 HHs benefited from year-round and increased irrigation water	0	48,000	44,878 (after 4 of 5 years)	n/a	n/a
40% of beneficiaries are from disadvantaged groups	n/a	40%	45%	n/a	n/a
70% of beneficiaries have landholdings smaller than 0,5 ha	n/a	70%	63%	n/a	n/a
30% increase in the yields of major food crops (paddy, wheat, and maize) Paddy Wheat Maize	 3.56 Mt/ha 2.09 Mt/ha 2.39 Mt/ha	 4.63 Mt/ha 2.72 Mt/ha 3.11 Mt/ha	 +34%[2] +26%[2] +75%[2]	+20%-30%	 15%[5] 25%[5] 65%[5]
30% increase in cropping intensity in SIP command area	160%	208%	+39% (223%)	Up to +100%	+18%[6]
Winter vegetable production increases by a minimum of 50% (by volume)	n/a	50%	+86%[2]	Significant	75%
90% irrigation schemes built or rehabilitated under the programme are functioning well after 3 years of completion	93%	90%	97%[3]	Solid constructions	n/a
At least 80% of water user associations establish a fund for operation & maintenance and major repairs, through the equitable collection of water service fees	0%	80%	100%[4]	Funds exist, user fees generally not	n/a
Outcome 3: Market actors offer innovative supports and products to farmers in irrigated schemes[7]					
70% of beneficiary farmers sell part of their irrigated agriculture production directly to the market	47%	70%	n/a	Most farmers sell part to market	54%

Legend. Color coding: green = target achieved, orange = target partly achieved, and red = no progress made. [1] OMS: Outcome monitoring summary, the programme's report on the achievement of targets from the results framework. [2] Based on a crop-cut survey by the programme; average increase over three grow seasons for paddy and wheat, for maize calculated based on two grow seasons, for vegetables, production level of 2023-24 (SIP, 2024) [3] Based on a survey of the 32 schemes from year 1 (SIP, 2024). [4] Setting up an operations and maintenance fund (with a 1% up-front payment of the construction costs) was a precondition for water user associations to receive support. [5] The field survey measured the increase in production, which can stem from an increased crop intensity and higher land productivity. [6] Based on total cultivated land across three seasons in and outside the small irrigation schemes, i.e., percentage increase within command area likely to be higher. [7] The original results matrix included two more indicators under outcome 3. Both concerned new contractual relations between smallholder farmers and input providers/traders. The programme's self-evaluation (SIP, 2023c) concluded that neither were in tune with the informal trading practices in Nepal's agricultural sector. It was decided to no longer track these indicators.

34. The field survey, by-and-large, corroborates the above findings. The field survey shows an increase in cropping intensity (albeit somewhat lower than expected), an increase in cereal and vegetable production (broadly in line with the programme data, although the increase in paddy production is markedly lower), and an increase in income from the cultivation of land (again on the lower side of the expected/observed bandwidth). Detailed tables on these results indicators are included in volume II of the report.

35. The field survey data, however, also contained some oddities. Two stand out.

- Only 49% and 54% of smallholder farmers respectively earned cash income from land cultivation before and after the rehabilitation of the small irrigation schemes. There are two possible explanations, but neither is fully satisfying / in line with the field mission observations: (i) people only cultivate the land for home consumption, and (ii) people lease out the land and the enumerators talked with the lessor instead of the tenant.[15]
- The overall agriculture income (including earnings from livestock and fisheries) rose faster than the income from land cultivation. This was unexpected as the field mission interviews told us that most smallholder farmers did not reinvest their income gains in expanding their farm business. At best, they used it as working capital for cultivating the land.[16] The reasons for the faster increase in agricultural income likely lie outside the influence of the Small Irrigation Programme.[17]

36. Both the field mission and survey, nonetheless, point to an increase in income. This increase in income *'changed the lives of smallholder farmers'* (SIP, 2022), as we will see in the next section.

3.2.4 The observed impact

37. The field mission told us that smallholder farmers use the production and income gains:

- for home consumption, reducing—for example the amount of paddy—that they need to buy on the market,
- to meet household expenditures (e.g., for food items, electricity, drinking water, local taxes, medical expenses, and the occasional small gift to their children), and importantly
- to send their children to private boarding schools in the local market towns with the express purpose to enable them a future outside of agriculture and possibly abroad.

38. The smallholder farmers unanimously observed that the small irrigation schemes, and the benefits it brought, *'eased their lives'*, improved their livelihoods, and enabled them to send their children to better schools and up into colleges.

39. The programme also sought to reduce the poverty incidence. According to the Ministry of Finance, multidimensional poverty in Koshi province was 15,9% in 2022 (just below target) (MoF, 2023). At the time, few households, however, had benefited from the Small Irrigation Programme. Moreover, the programme targets 48,000, whereas the eight target districts of Koshi province have 120,000 households and Koshi province itself close to 1,2 million households (NSO, 2023). This result indicator, therefore, seems somewhat ambitious and it would be a stretch to attribute the attainment of this indicator to the programme. Still, it will

[15] The average income for smallholder farmers from land cultivation was NPR 44,106 before the rehabilitation of the small irrigation scheme, and NPR 57,462 after the rehabilitation of the small irrigation schemes. This is an increase of 30%. When we calculate the income earned from land cultivation for only those smallholder farmers who earned an income from land cultivation, the figures are NPR 90,934 and NPR 106,623 respectively (an increase of 17%).
[16] This was partly confirmed by the field survey. Of the 57% who reinvested agricultural income, 67% invested this in the cultivation of land.
[17] An inquiry during the field survey into the reasons for the increase in agricultural income did not reveal much. The most common reason given was (i) a change in market prices, and (ii) a change in production quantity.

undoubtedly have contributed to poverty reduction as the beneficiary smallholder farmers improved their subsistence and cash income.

Textbox 1 Did the Small Irrigation Programme reach its outcome and impact targets?

The main text covered (or will cover), in passing, all of the programme's formal outcome and impact indicators. But what is the overall picture when looking at the results framework as a whole? The color coding in Table 2 offers a visual impression: most targets have been or will likely be achieved. This textbox adds a qualitative description/interpretation. In sum, the programme's outcome monitoring data, the field survey, and the field mission show that the programme is likely to achieve most of its outcome targets. This particularly concerns the amount of agricultural land put under year-round irrigation, and the increase in cropping intensity, land productivity, and vegetable production. Whilst this enabled an increase in income, this increase is slightly lower than aimed for. By-and-large, the Small Irrigation Programme appears to have been effective and impactful, when measured on its results framework. Finally, Table 2 hints at two possible outliers to an otherwise positive picture: only 67% of the schemes receive at least one visit from a rural advisory service provider during each grow season (instead of 100%), and whilst all water user associations set up a 'mandatory' operations and maintenance fund, few collect regular water user fees to maintain funding reserves. Both topics/observations will be picked up in below analysis. (A third outlier, the number of smallholder farmers who sell part of their produce to the market, surprised the review team as well. The field observations and the survey appear at odds here.)

3.2.5 Programme contribution – Part 1: irrigation works

40. To what extent did the Small Irrigation Programme contribute to these observed outcomes and impacts? Only 6 of the 1074 schemes built so far were new. The other 1068 entailed rehabilitated irrigation schemes. But as already alluded to, most of these schemes were leaky and could not provide year-round irrigation to their command areas. Fact is that the Small Irrigation Programme helped:

- identify those schemes with sufficient water availability at source to warrant the rehabilitation of the scheme,
- design the irrigation schemes using external small irrigation scheme design experts and modern software and geographic information systems,
- fund the material needed to build the schemes, including sand, cement, and iron rods,
- train the beneficiaries in the construction of the headworks and concrete linings of the irrigation schemes, and,
- jointly with the local government engineers supervise the construction of the small irrigation schemes by the beneficiaries.

41. This work resulted in small irrigation schemes with fortified, concrete headworks and full or partly concrete canal linings. Both the field survey and the field mission confirmed that the beneficiaries were (highly) satisfied with the new schemes. Moreover, the beneficiaries confirmed that the rehabilitated schemes ensured their access to year-round irrigation and, as noted above, enabled the increase in cropping intensity, land productivity, and vegetable production.

42. The schemes did, in some instances, build on previous canal strengthening measures supported by the Ministry of Water Supply, Irrigation, and Energy and its Division of Irrigation Offices[18]. Moreover, many farmer groups benefited from seed supplies and (matching) grants to acquire mini-tillers, small tractors, and equipment from the federal, provincial, or local governments. Such support, however, was received both before and after the construction of the irrigation canals, and the previous canal strengthening measures were insufficient to provide year-round irrigation to the command areas. The views were unanimous that it has

[18] The Division of Irrigation Offices was under the federal Ministry of Irrigation prior to the 2015 Constitution and the introduction of a federal system of government.

been the small irrigation schemes built under the Small Irrigation Programme which resulted in the improved outcomes and incomes.

3.2.6 Programme contribution – Part II: further feedback from the smallholder farmers

43. Still, this is not the whole story. There are three more aspects to consider. First, as can be gleaned from the theory of change, the increase in cropping intensity, land productivity, and income was to be further spurred by the introduction of good irrigation management, good agricultural (including post-harvest) practices, a shift to higher value vegetable production, and better market linkages. The smallholder farmers confirmed that they received training on irrigation management, good agricultural practices, and vegetable production, both from the programme and the agricultural section of the local governments. They, however, also observed that:

- this was mostly limited to a single (two-day) training,
- often only five households per water user association could participate in the off-farm trainings[19], and
- the trainings were too generic and that they were left with highly specific questions, such as:
  - what are the irrigation and fertilizer needs and best practices for specific (vegetable) crops?
  - how to deal with crop specific pests and diseases, especially of newly introduced vegetables with which they have little to no experience? and
  - what are the likely effects of, and mitigation measures, to changing weather patterns and untimely precipitation and droughts?
  - How to produce and store vegetable seeds?

44. The programme foresaw that each scheme would be visited at least once per growing season by a rural advisory service provider—either an extension worker from the local government or the private sector. The programme's own monitoring data notes that 67% of the schemes have received such a visit. The smallholders, however, observed that this was not enough, as they neither reach all smallholders (in need of advice) nor always have the knowledge (as the shift to vegetable cultivation is often also new to them or they do not have access to the state-of-the-art thinking on vegetable production).

45. Agricultural experts observe that agricultural irrigation and good agricultural practices can both boost land productivity by 25-30%. The Small Irrigation Programme delivered on the first, but did it fully seize the potential of the second? With an observed increase in land productivity between 20% and 45%, was there room for more? And was the Small Irrigation Programme truly designed to promote better agricultural practices?

46. The programme budget allocated less than 9% to technical assistance (see Table 1 in Chapter 1). Out-of-pocket expenditures on training water user associations was just 0,6% of overall expenditures (see Section 4.2.1). There, however, is some institutional context to this. Originally, the SDC had designed three programmes which were supposed to be implemented in parallel and complement each other: the Small Irrigation Programme to expand access to irrigation, the Nepal Agricultural Development Support Programme to strengthen the agricultural extension services of the local governments, and the Nepal Agricultural Market System Development Programme to commercialize agriculture and improve market

[19] The number of households per water user association varied from nine to over 150. Most water user associations, however, had between 20 and 40 households. The field survey suggests that only 10% of households received training on agricultural production.

functioning. The idea behind this three-fold approach was also that each programme could concentrate on its core competencies and that the cumulative outcomes would be more than the sum of these three programmes. Unfortunately, the Nepal Agricultural Development Support Programme, and thereby the effort to strengthen the local governments' agricultural extension services, was discontinued around 2020.

47. Should the Small Irrigation Programme have filled the gap left by the Nepal Agricultural Development Support Programme? This is a question that the programme has also pondered on. On the one hand, the Small Irrigation Programme was infrastructure focused, and through the delivery of this infrastructure delivered on most of its outcome indicators. On the other hand, the achieved income gains will likely fall slightly below target. Could higher income gains have been achieved with more intensive agricultural extension services? Was it a choice between numbers—between more smallholder farmers enjoy some income gains, or fewer farmers benefit from relatively higher income gains? Or could the Small Irrigation Programme have spent its funds slightly differently? We reflect on this last question in Chapter 4. For now, we leave these other questions for the reader's consideration.

48. The second aspect to consider is that the Small Irrigation Programme sought to better link water user associations to the offtake markets, both local, regional, and perhaps even international. As said, it was designed to work closely with the NAMDP to this end. Together with the NAMDP, it reached 208 water user associations (of the 1076 completed schemes)—through business-to-business meetings and traders (169) and training (39)—to facilitate their access to markets for their vegetable production (SIP, 2024). The field mission confirmed that especially the traders, with which NAMDP partnered, helped nudge the farmers to vegetable production as it offered them a ready offtake market.

49. Still, those water user associations that did not benefit from such support and still shifted to vegetable production were able to find markets for their produce as well. Moreover, those water user associations that did work with NAMDP supported traders did not necessarily stick to these traders. At the end of the day, they sold their produce to the highest bidder (which could be a trader but also, for example, migrant workers who resided in the vicinity to construct roads or hydropower plants). In other words, the NAMDP support appears to have been useful—oiling the trading machinery for those water user association benefiting from the support—but not necessarily essential as in Nepal *'markets work'*—supply and demand always find each other (Engelsman, Bahadur KC, & Nepal, 2023)

50. The third and final aspect to consider was already alluded to in Chapter 1 when we discussed the review's limitations. Smallholder farmers repeatedly observed that their production and income *'highly fluctuates'* depending on weather, diseases, and market prices. At the end of the day, we do not know whether the reported income data (during the field mission or the field survey) offer a fair reflection of the multi-year mean or are relatively high or low. As such, it would make sense for the SDC to repeat the field survey in the next two years.

3.2.7 Sustainability risks

51. Finally, how durable are the observed results? To what risks are the small irrigation schemes exposed? The review identified two possible risks: negligence and nature. We discuss each in turn. The small irrigation schemes are solid, no-frills[20], mostly fortified concrete

[20] For example, water distribution from the main canal occurs through 75 mm holes in the concrete lining. Most small irrigation schemes have few if any gate controls and no diversion structures. The distribution holes are plugged with grass and/or plastic sacks when no water is needed. The advantage is that construction costs is kept low (allowing for the construction of more

structures (although some earthen canal linings continue to be in use).[21] Even without maintenance, they should last a considerable time. Of course, proper maintenance (e.g., removing sedimentation and plastering small fractures) will ensure water availability and extend longevity. The schemes were built by the water user associations themselves and the smallholder farmers feel the (income) benefit. They expressed strong ownership of the schemes, and they have the knowledge and incentive to maintain the canals. Moreover, since most schemes existed prior to their rehabilitation, they did not face serious conflicts over water and land rights. This makes the risk of negligence and conflict small and the durability of the observed results strong. But there is a twist, which concerns the second risk.

52. During the field mission, we inquired after the availability of water at source and whether this had changed over the last 20 years or so (perhaps due to climate change). Generally, the water use associations noted that water availability at source had not changed, or had not reduced by much[22], and remained sufficient. The more imminent risk they faced was from falling rubble and landslides. This is a clear and present danger. Three out of the seven schemes visited during the field mission had their schemes damaged by falling rubble or landslides. This affected anywhere between two to 32 meters of concrete lining which were either destroyed or completely washed away (which, of course, amounts to the same thing). That these are no exceptions was illustrated by the fact that we observed at least six to eight mini landslides per day on our eight-day tour through the mid-hills of Koshi province.[23]

53. The programme sought to adapt to this, quasi unavoidable, risk by mandating an operations and maintenance (and repair) fund. Water user associations had to contribute 1% of the construction costs upfront to this fund. The programme also envisaged monthly or annual user fee contributions to this fund. Whilst some water associations charge small user fees, most do not. The programme's awareness-raising campaign on the need to charge user fees had been delayed and is now planned for the final implementation year. To cut a long story short, the available funds for repair are too small, and the costs of repair are generally seen as exceeding the purchasing power of the smallholder farmers in the water user associations. Most stakeholders involved belief any repair of damage to the schemes caused by rubble or landslides should be shouldered by the local or provincial government. Whilst local and provincial governments do provide such support on an ad hoc basis, no structural solution is at hand. This exposes the water user associations to a real and present risk, which could hamper their future irrigation, production, and income. Some key informants spoke, in that regard, of the need of a common *'rehabilitation fund'*.

3.2.8 Intermediate conclusion

54. This Section 3.2 applied a so-called contribution analysis. This is a structured inquiry to ascertain the extent to which the programme contributed to the observed results. In essence, it asks five questions (Mayne, 2008): (i) are the assumptions underlying the theory of change

schemes) and that there is little that can breakdown or malfunction. The disadvantage is that there remains some seepage, and the amount of water distributed to the agricultural land cannot be managed very precisely.

[21] From an engineering perspective, the small irrigation schemes appeared well-built, strong, with good finishing. The structures showed no leakage through the structures (although some at the distribution points). In some instances, the headworks appeared to lack sufficient diversion and retaining structures, as well as a launching apron, which carried the risk of a future washout.

[22] To the extent that water availability had become less, this was mostly attributed to alternative water schemes, either for drinking water or irrigation, not to climate change.

[23] Our field observations deviate in this respect to some extent from the CEDRIG assessment made in 2023 which concluded that the risk from natural disasters, climate and the environment were *'low, due to the careful and proper design and implementation of the schemes'* and their *'small-scale'*. Still, the study also observed that *'canal banks are fragile and hill slopes vulnerable'* (Strong, 2023). The latter was also confirmed during the field mission, which showed that portions of some canals were lying in wetlands and water seeped underneath the canals (posing a medium-term risk). Note that the field mission was conducted at the end of the monsoon season.

plausible and uncontested? (ii) did the envisaged activities take place? (iii) is there evidence that the assumed changes in behavior, decisions and actions occurred in practice? (iv) were the envisaged results achieved? (v) could other contextual factors have reasonably and significantly contributed to the results? Based on above analysis, we observe that:

- the theory of change of the Small Irrigation Programme was plausible and uncontested,
- the Small Irrigation Programme gave smallholder farmers access to year-round irrigation, and together with the NAMDP offered some water user associations direct offtake channels for their vegetable produce, whilst its support of agricultural extension services was useful but limited in scope and depth,
- smallholder farmers responded as envisaged: increasing their cropping intensity, raising their land productivity, shifting to some extent to vegetable production, and using their additional produce for home consumption or selling it to the market,
- most outcome targets have been reached and smallholder farmers enjoyed considerable income gains, and
- there are no other external or contextual factors—albeit, possibly, in part, market price fluctuations—which can account for the observed results.

In short, the Small Irrigation Programme—in all likelihood—achieved, and contributed to, its objective to *'boost agricultural income of small-scale and disadvantaged farmers'.* The next section picks up on the last aspect of this objective statement, namely the extent to which small-scale and disadvantaged farmers have benefited from the programme.

3.3. Gender equality and social inclusion

3.3.1 Objective and result indicators

55. The Small Irrigation Programme was to benefit smallholder farmers and disadvantaged groups. The SDC defined smallholding as cultivating less than half a hectare of land, and disadvantaged groups as people who are (i) discriminated against based on their ethnicity, caste, or gender, and/or (ii) are economically disadvantaged/poor (earning less than US$2 per day) and/or suffer food insufficiency (with food production from the command area of the proposed irrigation scheme sufficing for less than six months per year) (SIP, 2020; Innovative Circle, 2022).

56. The programme ensured the inclusion of smallholder farmers and disadvantaged groups upfront. In identifying and selecting the irrigation schemes and forming the water user associations, the programme made sure that it reached smallholder farmers and disadvantaged groups and that there was a fair representation of women, discriminated groups, and representatives from the head, middle, and tail-end[24] of the irrigation schemes in the executive committee of the water user associations. The programme's own monitoring data tell us that in the first four years of the programme:

- 63% of the beneficiaries have landholdings below 0,5 hectares (slightly below the target of 70%),
- 45% of the beneficiaries were from disadvantaged groups (above the target of 40%),
- 45% of the members of the water user associations' executive committees were women (above the target of 40%),
- 60% of the members of the water user associations' executive committees were from disadvantaged groups (no target set), and

[24] Landholdings are not equal, neither in size nor location. By ensuring equal representation of landholdings from the head, middle, and tail-end of the irrigation schemes, the programme helped ensure equal representation of farmers with different landholdings in size and location.

- nearly all water user associations had representation from the head, middle, and tail-end of the irrigation schemes in the water user association[25].

57. An independent social data verification study, conducted in 2022, confirmed that about 45% of the beneficiaries were from disadvantaged groups. The field mission received no signals to question the above data points. In fact, several key informants went even further: given the location and small size of the landholdings, all beneficiaries are relatively *'marginalized and economically deprived'*. Based on the above data, the Small Irrigation Programme achieved its formal targets and can be considered *'GESI-positive'*. As said, the only deviation is the proportion of beneficiaries with landholdings below 0,5 hectare. The programme consultant observed that given the myriad of criteria to identify and select small irrigation schemes, this particular criterion received slightly less emphasis from the local governments in selecting the irrigation schemes (and the programme consultant did not press). Still, the average landholding is 0,41 hectare which sits within the target.

3.3.2 Field mission observations

58. During the field mission, we held separate discussions with groups of women and individual women and members of discriminated groups (e.g., Dalits or Janajati). Most (but not all) were members of the executive committee of their water user association. Asked how the new small irrigation schemes and their participation in the water user association affected their lives, the women reiterated the positive impacts on their livelihoods (as shared in Section 34) and observed that:

- the new schemes required less maintenance and repair—a task often performed by the women—which *'saved time'*[26],
- membership of the executive committee gave them exposure to representatives of the local government and the programme consultant, as well as voice within the committee which increased their access to information and knowledge, influence on decision making within the committee, and standing within the community, and
- in some geographic areas (during the field mission, especially in the eastern most districts of Koshi province[27]), the cultivation, harvesting, and sale of vegetables and the subsequent income fell to women.

59. Viewed from the Gender Equality and Social Inclusion Framework[28]—commonly applied in international development cooperation—the above feedback suggests that women benefited from:

- greater 'agency' and 'voice' due to their membership of the water user association, and
- increased 'access' to agricultural production and income opportunities when the cultivation and marketing of vegetables fell to them.

60. Representatives from discriminated groups reported that the promulgation of the 2015 Constitution, and its premise of equality, had made the biggest difference in social relations. Even though *'discrimination continued to exist'*, they noted that they felt equal and heard within the executive committee of the water user associations, also noting that the water user association represented very small, relatively tight-knit communities.

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[25] The review team counted 16 schemes of the roughly 900 schemes for which data is available that did not have representation of either the head, middle, or tail-end of the schemes. This is just under 2% of the schemes.
[26] The field survey suggests a reduction of 77% in time inputs and 55% in cash inputs.
[27] This geographic delineation should not be overinterpreted. The ADB also found that during its community irrigation programme, women especially benefited from increased opportunities for vegetable production. The ADB program ran in other provinces.
[28] The GESI Framework typically highlights three domains of change: (i) improved 'access' to assets and services, (ii) increased 'agency, voice and influence' in decision-making, and (iii) gender-positive changes in society's social norms, laws, and policies, which induce more equal participation and representation (Premchander & Behera, 2023).

Note: A word of caution. These last observations from discriminated groups stem from just a handful of interviews, so we probably should be cautious not to overinterpret them. And as said in Chapter 1, the review did not have the time and resources to study the effects on intragroup inequalities, for example between women member and non-members of the executive committee, or farmers with markedly different sizes of landholdings. It is easy to imagine that (non-)participation in the executive committee can increase inequalities between women[29], and that smallholders with relatively larger land plots (e.g., one hectare instead of a quarter) have more opportunities to benefit from the year-round irrigation. A thorough assessment of the extent to which the programme contributed to gender equality and social inclusion would need to investigate this aspect as well.

3.4. The federal system of government in the agricultural irrigation sector

61. In this section, we turn to the Small Irrigation's Programme's second objective, namely, to embed Nepal's nascent federal system of government in the governance and steering of the agricultural irrigation sector. We briefly discuss the background, the implications of, and the field mission observations on this effort, before drawing an evaluative conclusion.

3.4.1 What is the background?

62. In 2015, Nepal adopted a new constitution. This was the next consequential step, after the Comprehensive Peace Agreement of 2006, to resolve Nepal's enduring civil conflicts. The new constitution introduced a federal system of government in which all people—independent of their identity, ethnicity, caste, geography, and gender—were to be made part of the body politic and able to participate in the political process.

63. Switzerland has accompanied Nepal's peace and reconciliation process for over 20 years, through peace mediation, making available constitutional and federalization expertise in the run-up to the new constitution, facilitating transitional justice, and supporting the implementation of the new constitution after 2015 (Engelsman & Hobley, Independent Evaluation of the Nepal Cooperation Strategy 2018-22, 2022). It intends to continue to accompany the implementation of the constitution and building the federal system of government in the years ahead (SDC, 2022).

3.4.2 What did this mean for the Small Irrigation Programme?

64. The SDC describes federalism as:

> '*a system of government in which powers are divided between a central governing authority and constituent political units with substantial autonomy (at least two tiers of government). The central governing authority has certain exclusive federal powers, the constituent political units have certain rights, and they both share certain concurrent powers. In federations the right to self-government of the political units is constitutionally entrenched'* (SDC, 2016).

65. And that is how it is in Nepal. The 2015 Constitution introduced three spheres of government—federal, provincial, and local—and assigned exclusive and concurrent rights to them. As for agricultural irrigation—building on a section in the constitution which states that the government shall, amongst others, *'develop a sustainable and dependable irrigation system by controlling water related natural disasters with the management of the river systems'*—the constitution gives authority for *'large and inter-provincial irrigation projects'* to

[29] For example, several women responded that they were already active in the community before the construction of the small irrigation scheme and that this led to their election in the executive committee. On other hand, the communities are very small and not everyone wants to take a leadership role.

the federation, *'provincial-level'* irrigation projects and the formulation of sustainable and reliable irrigation development policy to the provincial government, and *'local'* irrigation to the local government (Constitute Project, 2021). This power distribution was later reconfirmed in the Unbundling Report (GoN, 2016), the National Planning Commission Guidelines 2076 (NPC, 2020), and the Koshi province Irrigation Act 2075 (MoWSIE, 2019). Moreover, and importantly, the constitution places emphasis on *'maintaining relations between the federal units on the basis of cooperation between them'* and *'the principles of cooperation, coexistence and coordination'* (Constitute Project, 2021).

66. Against this backdrop, when the Small Irrigation Programme was to strengthen the federal system of government, what was this supposed to mean in practice? After the promulgation of the constitution, the SDC restructured all its projects to abide by the federal structure and functioning of government (Engelsman & Hobley, Independent Evaluation of the Nepal Cooperation Strategy 2018-22, 2022). In the case of the Small Irrigation Programme, this meant to:

- empower local governments to identify, select, design, and implement small irrigation schemes, and
- enable the provincial government to set an irrigation development policy and play a coordinating role.

67. Moreover, the three levels of government and the SDC sought to give meaning to the principle of *'cooperation, coexistence and coordination'* by setting up a:

- Programme Coordination Committee—chaired by the Minister of Water Supply, Irrigation, and Energy of Koshi province and representation of local governments—to supervise, coordinate, and steer the Small Irrigation Program (i.e., this was to strengthen the collaboration between the provincial and local governments),
- Programme Advisory Committee, including representation of the federal Department of Local Infrastructure, to advice on the programme and offer a channel to distribute best practices and lessons learned to Nepal's other six provinces and their local governments (i.e., to maintain good relations with the federation), and
- joint funding structure with the federal, provincial and local governments each bearing 20% of the construction costs of the small irrigation schemes (with the remainder carried by the water user associations and the SDC—see Table 1 in Chapter 1).

68. How has this played out in practice? Have provincial and local governments been able to better assert their roles. Has the Small Irrigation Programme added to their capacity to perform their roles? And has the joint funding and participation in the governance of the programme strengthened the federal system of government? It is to these questions that we now turn.

3.4.3 What did we observe?

69. The local governments have been closely involved in the selection of the small irrigation schemes and the supervision of their construction. They have also adopted the Small Irrigation Guidelines, which the programme prepared under supervision of the Ministry of Water Supply, Irrigation, and Energy of Koshi province. Moreover, the local governments attributed the financial involvement of the provincial and federal government—which they appreciated, and saw as necessary, given their own limited funding sources—to the SDC funding.

70. The local government engineers, however, were not included in the detailed design of the irrigation schemes and were not introduced to the programme's design and project preparation report software system. The programme noted, and the local government engineers acknowledged, that this was, in part, a time/availability question. The local government engineers oversee hundreds of projects and simply did not have the time to be involved in the

detailed design. On the one hand, this appears to be a lost opportunity to strengthen the capacity of the local government engineers (through real-life, on-the-job training) and enable them to continue to support the rehabilitation of small irrigation schemes after the Small Irrigation Programme ends.

71. On the other hand, the question is whether local governments need such detailed design capacity in-house or whether they should and could procure this from the market or whether such expert knowledge should and could reside with the provincial government.[30] This is a valid question, to which we do not have a definitive answer—it depends on the resources of the local governments and the role it sees for itself. But, it appears, that neither the programme nor the local governments have addressed this question either. If the goal is to strengthen the capacity of the local governments and ensure that they can continue supporting the rehabilitation of small irrigation schemes, should the programme not have an answer to this question and a strategy to support the local government therein? And does the same not apply to the uptake of the Small Irrigation Guideline (as the programme acknowledges that these guidelines have been adopted, but have yet to be used by local governments)?

72. The picture for the provincial government is mixed as well. On the one hand, the Ministry of Water Supply, Irrigation, and Energy has an annual budget of around NPR 1.5 billion (equivalent to CHF 9.5 million) for constructing, rehabilitating, and repairing irrigation schemes. The Ministry noted that roughly 75% of this budget goes to small irrigation schemes, and that of the 2,000 irrigation schemes supported in 2023-24, roughly 50% were small scale[31]. The Ministry also reserved a budget to host the programme's design and project preparation report software system on its server.

73. On the other hand, a programme coordination unit was set up to, ostensibly, coordinate the Small Irrigation Programme and assert the role of the provincial government. This unit, however, has only two members: the head of the Irrigation and Energy Section, and a civil engineer. A far cry from the 88 staff that the programme consultant employs. Importantly, the Ministry does not yet appear to have a strategy or programme in place to continue the Small Irrigation Programme (best practices) after the programme ends in July 2025 and how it intends to use the programme's design and project preparation report software system. Instead, it, and the federal and local governments, called upon the SDC to continue the programme.

74. The federal Department of Local Infrastructure's engagement was limited to their participation in the Programme Advisory Committee, which meets once per year. They welcomed the programme's joint funding model and said they had copied it in subsequent World Bank and ADB projects. They also promised to share the Small Irrigation Guideline with the other six provinces and 616 local governments (SIP, 2022; 2023).

3.4.4 Intermediate conclusion

75. Where does this leave us? On the one hand, without true fiscal decentralization[32] with which local governments gain the financial headroom and autonomy to exercise their rights and

[30] Prior to the 2015 Constitution, agricultural extension services were provided by the district agricultural development offices (DADO). Under the federal system of government, these seized to exists. Their knowledge and staff have partly been absorbed by the provincial level agricultural knowledge centers and partly by local governments. The agricultural research centers, however, are focused on research, not extension services.

[31] In Nepal, small scale irrigation is defined as covering a command area of less than 50 hectares in the mid-hills of Nepal (NPC, 2020; MoWSIE, 2019; GoN, 2023)

[32] The SDC defines fiscal decentralization as '*intergovernmental fiscal transfers to subnational governments which allows them to function properly. Fiscal decentralization policy also addresses such issues as revenue assignments (assignment of local taxes*

duties, including—as per constitution—promoting small-scale agricultural irrigation, the programme's joint funding and governance gives a model and a practice on how the three spheres of government can *'coordinate, cooperate, and co-exist'*. Whilst Chapter 4 will place a critical question at the governance of the programme 'in practice', this in-and-by-itself is in line with, and strengthens, the implementation of the constitution.

76. On the other hand, the center of gravity within the Small Irrigation Programme lies very much with the programme consultant. This is to the detriment of the local and provincial government which missed an opportunity to lead the programme, strengthen their capacity, and assert their constitutional rights. When the SDC speaks about federal state building, it is indeed this what it strives for: strengthened capacity to perform its constitutionally prescribed roles.

77. Moving forward, what lessons could be drawn from the SIP experience? Was the programme, at the end of the day, too infrastructure driven? Was it too outcome-oriented? Were the numbers of schemes built and households reached perhaps more important than the quality and replicability of the implementation process? Could a slightly slower pace, a larger lead from the provincial and local government staff, and more handholding and peer support from the programme consultant have enabled the provincial and local governments to assert their constitutional roles even more, and with more capacity? Given the scarcity of resources, the provincial and local governments appeared happy to abdicate this responsibility. But from a development, sustainability, and federalism perspective, would it not have been better? Again, we leave these questions for the readers' consideration and will return to them in Chapter 5 and 6.

78. Finally, we have left one specific review question from the SDC unaddressed: should the endorsement of the Federal Civil Services Act have been a conditionality before the start of the phase? This question is answered in Textbox 2.

Textbox 2 The Federal Civil Services Act

A federal structure of government grants *'substantial autonomy'* to the different political units and levels of government (SDC, 2016). In principle, this means that each body politic should be able to elect its political leaders, and each level of government recruit, manage and regulate is own staff. Through the 2017 and 2022 provincial and local elections, the right to select one's own political leaders at the provincial and local level was secured. The power of the local and provincial governments to recruit their own staff, however, awaits the adoption of a pending Federal Civil Service Act, which nine years after the promulgation of the constitution has yet to pass parliament (DRC, 2024; The Kathmandu Post, 2024; Adhikari & Upadhyay, 2024).

At face value, this is problematic. Several recent articles also explain why and why it would be better to give this autonomy to the provincial and local government (DRC, 2024; The Kathmandu Post, 2024; Adhikari & Upadhyay, 2024). However, the discussions with four local governments during the field mission—by no means a representative sample—downplayed the size of the problem. Three of the four local governments noted that they *'have sufficient staff capacity'*, either federal staff or staff temporary recruited by the local governments (outside the prevailing public service act). In other words, some local governments are findings ways to deal with the absence of a new federal civil service act. Of course, the adoption of a new federal civil service act—one in line with the 2015 Constitution—would still be better. The SDC has advocated for it in its political dialogue (Engelsman & Hobley, Independent Evaluation of the Nepal Cooperation Strategy 2018-22, 2022). The SDC, however, also recognizes that (i) this is ultimately something Nepal's parliament must decide, and (ii) if it had made it a conditionality to have a new federal civil service act approved before phase II of the Small Irrigation Programme, the programme would simply not have started. The politics behind the procrastination around the federal civil service act easily supersede/outweigh the importance of the Small Irrigation Programme.

and revenue-sharing), subnational government borrowing and debt, and the assignment of expenditure responsibilities' (SDC, 2016).

3.5. Conclusion

79. The SDC, the Ministry of Water Supply, Irrigation, and Energy of Koshi province, and the water user associations, wanted—through the Small Irrigation Programme—to expand the agricultural land under year-round irrigation, increase the cropping intensity, raise land productivity, and improve agricultural incomes of smallholder farmers, especially from disadvantaged groups. This chapter evidenced that these envisaged results have been achieved by the Small Irrigation Programme: it has been both effective and impactful. The programme could potentially have been even more effective and impactful if it had found a way to better integrate agricultural extension services in its support to the smallholder farmers. The review cannot say anything about possible effects on intragroup inequalities.

80. Especially the SDC also emphasized the need for (i) the small irrigation schemes and the resultant income gains to be sustainable, and (ii) the provincial and local governments to be strengthened in their constitutional roles and able to replicate the Small Irrigation Programme. Whilst the small irrigation schemes are solid structures that should last a considerable time, they are exposed to landslides. Restoring the damage from landslides quickly exceeds the funding capacity of the water user associations, also because the smallholder farmers are not investing in their farms to grow their business. The provincial and local governments are willing to step in, but at the same time still lack the specific strategies, plans, knowledge, budgets, organization and/or capacities to respond efficiently to damage reports and replicate the programme after its completion in 2025. The programme was certainly in line with Nepal's federal system of government but could probably have done more to strengthen it by involving provincial and local staff more closely in the programme implementation.

4 Efficiency and governance

Evaluation questions

To what extent was the SIP cost-effective, i.e., what was the net benefit-cost ratio and how does the total cost per beneficiary compare with similar interventions by other development partners, and were the outputs and outcomes delivered in time? How efficient were the governance, management, implementation, and monitoring of the SIP, in particular the functioning of the Programme Advisory Committee, the Programme Coordination Committee, the Programme Implementation Committee at the local government level, and the programme team (including the latter's ability for self-reflection and adaptation)?

4.1. Introduction

81. This is the last chapter before we draw an overall conclusion and formulate recommendations. This chapter discusses the two distinct topics of efficiency and governance[33]. We start with efficiency—studying it along four dimensions. First, we ask the question whether—with hindsight and based on Chapter 3's contribution analysis—the programme could have achieved better results through a different allocation of resources. We do not ask this question to judge, but rather to learn from what we now know from this review. This learning can inform future projects.

82. Second, we compare the cost per scheme, beneficiary and hectare of irrigated land of the Small Irrigation Programme with other small-scale irrigation projects that have been implemented in Nepal. This will give us a sense of relative efficiency of the Small Irrigation Programme. Third, we calculate the programme's benefit to cost ratio based on the net present value of the programme's benefits and costs. Fourth, we reflect on whether the envisaged results were delivered within the envisaged period. These four different inquiries subsequently allow us to draw an overall conclusion on the efficiency of the Small Irrigation Programme. We subsequently close the chapter with a reflection on the governance and management of the programme. As each subsection ends with a comprehensive, stand-alone, conclusion, we forego an overall conclusion in this chapter.

4.2. On efficiency

4.2.1 Follow-the-money analysis

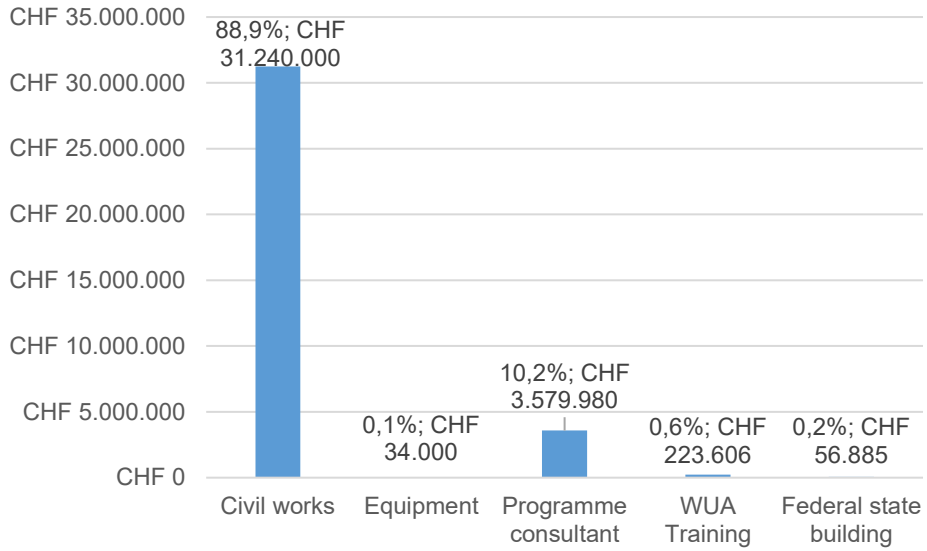
83. Figure 2 shows the programme expenditures per 15 July 2024. These are the expenditures for the first four years of the five-year programme period. The figure evidences that the Small Irrigation Programme is—first-and-foremost—an infrastructure development programme. The civil works, i.e., the construction of the small irrigation schemes, subsumed 89% of total programme expenditures. Note: this was according to plan. The programme document indeed foresaw 89% of total programme costs to go to the construction of the small irrigation schemes (SDC, 2020).[34]

84. Chapter 3 found that the Small Irrigation Programme is on track to achieve some of its key targets (i.e., amount of agricultural land under year-round irrigation and the increase in cropping intensity, land productivity, and vegetable production). At the same time, it raised the question whether land productivity could have increased more, and more smallholder farmers could have shifted more land to vegetable or other high-value crops production. The evidence suggests that this would have required tailor-made agricultural extension support to smallholder farmers. Similarly, Chapter 3 asked whether the programme should have spent

[33] Of course, the topics could be linked as good governance should facilitate the efficient implementation of the programme.
[34] We also recall that there is some institutional context to this. Initially, it was thought that the parallel Nepal Agricultural Development Support Programme would tackle the agricultural extension services (see also Section 3.2.6).

more time and effort on peer support and building the capacity of the provincial and local governments. Figure 2 shows that less than 1% of the expenditures were spent on training the water user associations (including agricultural extension work) and institutional strengthening of provincial / local governments.

Figure 2 Programme expenditures until 15 July 2024 per category of expenditure



Source: Expenditure data from the programme consultant (SIP, 2024)

85. Of course, the institutional strengthening of the provincial and local government does not necessarily incur direct expenses. It is more a matter of involving provincial and local government staff in the programme activities and offering them on-the-job training and peer support. Still, Figure 2 and the analysis of Chapter 3 beg the question whether the Small Irrigation Programme should not have spent a little bit more on agricultural extension and institutional capacity development to achieve even better results.

86. In the end, there is a trade-off to be made. Within a given budget, more soft support means less money for infrastructure investments. What if the Small Irrigation Programme had spent five times more on training water user associations and individual smallholder farmers, as well as institutional capacity building of the provincial and local governments, i.e., CHF 1,402,457 instead of CHF 280,491? The programme would have had to forgo the construction of 41 small irrigation schemes.[35] This means that about 1710 households[36] would not have benefited from year-round irrigation and the concomitant increase in income. However, an x-number of households would have benefited from agricultural extension services and potentially seen their income increase more than was currently the case. This raises two questions:

- could—with a five-fold increase in expenditures on agricultural extension support—more than 1710 households have been reached with effective agricultural extension support, giving them the opportunity to increase their income by more than the current 30%?
- what do the programme principals and stakeholders prefer: a smaller number of smallholder farmers with a larger income increase or more farmers with a somewhat lower income increase?

87. We presume that the answer to the first question is yes (or, at least, is potentially yes), as the introduction of good agricultural practices can boost land productivity by 25%-30%. This

[35] Based on an average construction cost of CHF 27,556 per scheme in the first four years of the programme. See also Table 3.
[36] Based on, on average, 42 households per irrigation scheme.

means that there is indeed a choice / a trade-off to be made (the second question). There are good arguments to choose either option. This review will not elaborate on them. Instead, we raise a question: should the SDC, in the future, address such a trade-off question explicitly by means of an upfront economic analysis to calculate the size, and understand the nature, of the trade-off? The answer probably depends on the circumstances. It is a call for the SDC to make in each specific case/project.

4.2.2 Cost-effectiveness analysis

88. Table 3 compares the Small Irrigation Programme with two community-managed irrigation scheme programmes in Nepal supported by the Asian Development Bank. The Community Irrigation Project (CIP) is the most comparable with the Small Irrigation Programme as it focused on small-scale irrigation schemes. However, it also included schemes in Nepal's flatlands (the Terai). The Community Managed Irrigated Agriculture Sector Project (CMIASP-AF) targeted relatively larger community-managed irrigation schemes. The comparison shows that construction and total project costs per scheme of the Small Irrigation Programme were competitive / cost-effective. The construction and project costs per household and hectare are very similar between the Small Irrigation Programme and the Community Irrigation Programme. The two programmes had a similar cost-effectiveness.

89. As the Community Managed Irrigated Agriculture Sector Project targeted relatively larger irrigation schemes, it makes sense that their cost per scheme was higher and cost per beneficiary and hectare were lower. Finally, we compared the Small Irrigation Programme with the industry standard on these metrics. These industry standards were derived from a ChatGPT inquiry, which based itself on the experiences of leading international development organizations[37]. The Small Irrigation Programme lies below or within (the lower end) of the reported average cost range per household or hectare.

Table 3 A comparison of projects

Description	ADB CIP	SIP II	ADB CMIASP	Industry metrics[37]
District	12 districts	8 districts	39 districts	
Period	2011-2017	2020-24	2014-2022	
Total number of schemes	456	1.074	129	
Total beneficiary households	34.961	44.878	55.350	
Area achieved	16.936	18.227	30.452	
Civil works costs	CHF 24.104.351	CHF 31.248.217		
Project costs	CHF 31.656.032	CHF 35.108.884	CHF 33.102.999	
Construction cost per scheme	CHF 52.860	CHF 29.905		
Project cost per scheme	CHF 69.421	CHF 32.690	CHF 256.612	
Construction cost per household	CHF 689	CHF 696		CHF 126-840
Total project cost per household	CHF 905	CHF 782	CHF 598	CHF 420-1260
Construction costs per hectare	CHF 1.423	CHF 1.714		CHF 1.680-4.200
Project costs per hectare	CHF 1.869	CHF 1.926	CHF 1.087	CHF 3.360-10.080

Legend: CIP = Community Irrigation Project, ADB; Community Managed Irrigated Agriculture Sector Project, ADB; color coding is based on comparison with the Community Irrigation Project. Dark green = lower, light green = same level, orange = somewhat higher. **Note**: construction and project costs of the Community Irrigation Project have been stated in 2023 prices (based on the increase in the Nepal consumer price index). All costs have been calculated in Swiss francs based on the September 2024 exchange rate. **Source**: (SIP, 2024; ADB, 2020; ADB, 2024).

[37] These metrics were ostensibly derived from the experiences of the African Development Bank, Asian Development Bank, Food and Agriculture Organization, International Fund for Agricultural Development, International Water Management Institute, United Nations Development Programme, USAID, and World Bank.

4.2.3 Benefit-cost analysis

90. We subsequently conducted a benefit-cost analysis. The result of this analysis must be interpreted cautiously, i.e., should not be considered a hard fact. For two reasons:

- the production and income gain data are based on a one-off observation by the field survey (conducted in August 2024). We do not know whether the reported production levels and incomes coincide with the multi-year average or are rather high or low, and
- some of the key assumptions made in the benefit-cost analysis are rather arbitrary, simply because we lack solid evidence for these assumptions.[38]

91. With these words of caution, our calculations give a benefit-to-cost ratio of 3.9 (with a 6% discount rate) and 3.2 (with a discount rate of 9%). In other words, for every Swiss franc invested by the Small Irrigation Programme, smallholder farmers benefit 3 to 4 Swiss francs. In other words, the benefits trump the costs by 200-300%. From a benefit-cost analysis point of view, the programme can be considered cost-effective. The benefit-cost ratio lies above the typical range for benefit-cost ratios for irrigation projects in developing countries, which generally varies between 1.5 to 3.[39] To solidify this conclusion, the SDC could repeat the field survey and the benefit-cost analysis on an annual basis for the next, say, three years.

4.2.4 Timely delivery

92. The OECD/DAC evaluation criteria on efficiency includes the dimension of the timely delivery of the programme results. This evaluation question has already been answered—in part, albeit indirectly—in Section 3.2.3 (Textbox 1). In short, the programme is on track to put 20,000 hectares of land under year-round irrigation and concomitantly, as envisaged, raise the cropping intensity, land productivity, and vegetable production within the programme period. In other words, the programme is expected to deliver its core agricultural outputs and outcomes in time. The programme's impact—an increase in agricultural income—will be positive, albeit slightly lower than targeted. This, however, is not a question of time, but rather the likely product of (i) insufficient (support to smallholder farmers on) good agricultural practices, and (ii) the smallholder farmers not investing in their business / farm expansion.

93. On its second objective—federal state building—the programme has contributed, through its governance structures, to coordination between the three spheres of government on agricultural irrigation in Koshi province. Still, it could probably have done more within the given time to strengthen the capacities of the local and provincial governments. This would have allowed them to exert their rights and roles under the new constitution even better. In sum, the Small Irrigation Programme delivered on time its agricultural irrigation work and could have done more on strengthening the federal system of government within the programme period.

[38] This particularly pertains to the assumed depreciation of the small irrigation schemes and, consequently, the sustainability of the income benefit. We assumed five-years of unobstructed functioning of the small irrigation schemes starting from 2024 and a five percent net depreciation rate thereafter. This gives an economic life of the small irrigation schemes of 25 years, and slightly longer for the schemes built in the first three years. The latter is justifiable as the Small Irrigation Programme has rehabilitated 30 already rehabilitated schemes which were damaged after the 2021 floods. Other key assumptions are a weighted cost of capital of 6% (World Bank (2016)) and 9% (Asian Development Bank (ADB, 2017)) and an inflation rate of 6% (which is the average annual increase in the consumer price index over the last 25 years (World Bank, 2024)). In addition, estimates were made of the value of the additional home consumption based on relative contribution of cereal and vegetable sales to the income increase and the observed share of total cereal and vegetable production used for home consumption. The full benefit cost analysis and detailed assumptions are included in Appendix I in volume II. The underlying calculations for home consumption value are included in Appendix H in volume II.

[39] This is again based on a ChatGPT inquiry into typical benefit-cost ratios for irrigation projects in developing countries, especially in Asia. The range is ostensibly based on experiences from the Asian Development Bank, the Food and Agriculture Organization, the International Fund for Agricultural Development and the World Bank.

4.2.5 Conclusion

94. With the risk of repetition, this section evidenced that the programme was by-and-large implemented cost-effectively. It also suggested that it could potentially have been even more cost-effective if it had spent more time and resources on tailored agricultural extension services and involved the provincial and local government staff more fully in the programme activities, especially in the design of the small irrigation schemes.

4.3. Governance and management

4.3.1 The programme advisory and coordination committees[40]

95. Chapter 1, Figure 1, introduced the programme's governance structure. Programme oversight was the responsibility of the:

- Programme Advisory Committee, co-chaired by the Secretary of the federal Department of Local Infrastructure and the Swiss Ambassador, and the
- Programme Coordination Committee, co-chaired by the Minister of Water Supply, Irrigation, and Energy of Koshi province and the Swiss Ambassador.

96. Both committees meet once per year. The minutes of the past meetings revealed that both committees—based on a presentation by the programme consultant on the intermediate results—raised and discussed pertinent questions. For example, committee members inquired, amongst others, into:

- the programme's support in building local government systems and capacities and preventing the encroachment of rights between the spheres of government (SIP, 2023),
- the role the federal Department of Local Infrastructure could play in replicating the results of the Small Irrigation Programme (SIP, 2022; 2023; 2023),
- the potential and demand for upscaling the programme both within the current, and extending to other, local governments in Koshi province (SIP, 2024), and
- the need for more attention to linking the completed schemes to agricultural extension services (SIP, 2022) and markets (SIP, 2024) for additional income generation.

97. Moreover, the meetings and discussions themselves were seen to have value. As already observed in Section 3.4 and acknowledged in the Programme Coordination Committee (SIP, 2023), the participation of the federal, provincial, and local governments in the funding and oversight of the Small Irrigation Programme gave hand-and-feet to the constitutional principle of *'cooperation, co-existence, and coordination'* between the three spheres of government. The two committees became a conduit for *'sharing information'* on agricultural irrigation in Koshi province. The Programme Coordination Committee also stepped in and secured the necessary budget allocations from the federal to the provincial government when the latter had to temporarily reduce its contributions due to budget cuts from the federal government.

98. Some of the above questions, posed in the committee meetings, also emerged from this review: Have the capacities of the provincial and local governments been sufficiently strengthened? How will the programme be replicated and be brought to scale? And could the programme have better supported—directly or indirectly—with agricultural extension services? This raises another question: what have the committees decided and done to follow-up on and answer these questions? The minutes of the meetings do not evidence follow-up

[40] The evaluation question also refers to the programme implementation committees. These operated at the local government level. They were meant to facilitate and oversee the identification, selection, design, and construction of all the small irrigation schemes within a given municipality. The functioning of these programme implementation committees was not explicitly discussed with key informants (given the many topics that had to be covered during the interviews). At no point, however, were these committees raised in any of our discussions. We take from this that they were neither critical nor problematic, although—in all likelihood—still useful as they brought all the key stakeholders within the municipality together.

(actions) and revisiting these topics in subsequent meetings. The key informants involved in these committee meetings confirmed that there indeed was no follow-up to these questions.

99. In other words, the committees did not agree on *'follow-up actions'*, nor *'steered'* the programme based on the outcome of these discussions and actions. Should the two committees have done more? Should they have addressed and followed up their own highly strategic and relevant questions more rigorously, trying to find answers, and steering the programme accordingly? What prevented the committees from considering the possibility of amending the programme's strategy, activities, and results indicators? We leave these questions for the reader's own consideration and follow-up.[41]

4.3.2 Programme monitoring

100. The leading evaluation question for this section inquires after the programme consultant's *'ability for self-reflection and adaptation'.* Based on the collected data, we can respond to this question from three different perspectives. First, in Section 2.3, we concluded that the programme consultant responded with the appropriate and *'necessary acceptance, flexibility, and perseverance'* to challenging development contexts, i.e., political instability, the covid-19 pandemic, and temporary budget cuts from the provincial government.

101. Second, in May-June 2023, the programme conducted a self-evaluation. Amongst others, it concluded that its indicators for programme steering on the market linkages of the supported water user associations were at odds with Nepali practices. In response, and with agreement of the SDC, the programme consultant changed the indicators[42] (SIP, 2024). Third, the programme consultant kept close tabs on its results framework which included both indicators for programme steering and accountability. It reported on its results indicators twice per year in written form, and once per year orally, to its principals, i.e., through its bi-annual progress reports and its presentation to the programme advisory and coordination committees. As such, the programme consultant (and principals) had, at all times, a good sense of whether the programme was on track to achieve its impact and outcome indicators.

102. As said in Chapter 3, and acknowledged by the programme consultant, the programme is on track to meet many of its envisaged outcomes and, to a significant degree, impacts. But not all. And the programme's own results monitoring gave early signs to this end. This pertained both to the lagging agricultural extension services and lagging institutional capacity of the provincial and local governments. The programme did not, to any significant extent, adapt accordingly. Instead, it mostly continued with the implementation of the original programme design and logic.

103. Where does this leave us? The programme (consultant) both adapted and did not adapt. In other words, there is room for improvement. The question (closely related to the question left at the end of the previous section) is how to invoke even greater responsiveness and adaptability? Again, we leave these questions for the reader's consideration and follow-up.[43]

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[41] Our own two cents on this are that programme advisory and coordination committees need to be explicitly, actively, and ongoingly empowered to think and act strategically, i.e., given the room to question and adapt the programme under implementation based on evidence of what is working, what doesn't and why. In our experience, such an environment and process can only be initiated through active leadership and guidance from the lead funding agency, in this instance the SDC.

[42] The original results framework included as indicators: (i) 50% of the water user associations have contracted at least ne input provider in the last 12 months, and (ii) 50% of the small irrigation schemes have established contracts with traders or wholesalers to buy their crops. It is not customary for smallholder farmers to enter formal (longer-term) contracts with inputs providers, traders, and wholesalers. The programme consultant therefore started to look at actual volume sold to traders, aggregators, and wholesalers rather than the contracts that they enter.

[43] Similar to footnote 41, our view is that the results framework should not just be seen as a means for accountability, but also as a tool for steering. Moreover, both the program approach/theory and the results framework should be considered as written in stone, but as something than can (and should) be adapted as evidence pours in about what works, what doesn't, and why.

5 Conclusion and lessons

5.1.1 On agriculture and small-scale irrigation

104. Supporting the rehabilitation of small irrigation schemes works—in part. It allows smallholder farmers within the command area of the irrigation schemes to increase their cropping intensity, land productivity and the production of higher value crops (including vegetables), sell the surplus production to the market, raise their cash income, and improve their livelihood. On this part, the Small Irrigation Scheme was effective. However, as long as the investment in the small irrigation schemes is not part and parcel of a commercially run farming business, the investment is not sustainable as the farmers do not invest in the farm, nor generate the turnover enabling them to maintain (if not expand) the irrigation schemes.

105. This brings us back to a question raised in Chapter 2: is the rehabilitation of the small irrigation schemes in line with the government objective to *'modernize, mechanize, and industrialize agriculture'*? The answer is not as straightforward as the question (implicitly) suggests. The mechanization and industrialization of agriculture is easier in the Terai than in the mid-hills of Nepal. Simply a matter of geography. Still, the experience of the Small Irrigation Programme points to an emerging opportunity to align the two and answer the above question with a (counterintuitive) yes.

106. Farmers consistently reported that they wanted to provide their children a future outside agriculture. People are also migrating to the cities and abroad. Agricultural labor was in short supply. In other words, the available land must be cultivated by less people. These motivations and developments give the opportunity to revisit Nepal's land use policy and foster land pulling and consolidation. Consequently, the next (evolutionary) step might well be the structural transformation of the agricultural sector in the mid-hills of Nepal from subsistence to commercial farming. Whilst the Small Irrigation Programme undoubtedly improved the lives of the beneficiary smallholder farmers, the question for the protagonists of the Small Irrigation Programme is: do you wish, and do you have the opportunity, to push this structural transformation along (for example by promoting land policy reform, giving access to start-up capital, easing access to credit, and further improving road connectivity)?

5.1.2 On federal state building

107. The Small Irrigation Programme was structured along the intent and principles of the 2015 Constitution and the realities of Nepal's political and fiscal decentralization. The responsibility for the identification, selection, and supervision of investments in small irrigation schemes in the Small Irrigation Programme lay squarely with the local government. Given the local governments limited fiscal means, contributions from the provincial and federal government were a must. The latter were also included in the programme governance in line with the constitutional principle of cooperation, co-existence and coordination.

108. Provincial and local government staff, however, were not involved in the detailed design of the small irrigation schemes, nor worked with the programme's design and project preparation report system (software) or led programme activities. This not only undermined the replicability of the programme, it also prevented the provincial and local government staff from building their capacities. It is these capacities which will allow the provincial and local governments to exert their constitutional rights. The constitution places the responsibility for small-scale irrigation with local governments. The question is whether it is efficient for all local governments to have the program consultant's capacities 'in-house' or is it more efficient to source this expertise from the market / the provincial government. The provincial government's responsibility for local economic development gives it an entry point for a coordinating role.

6 Recommendations

109. The purpose of this external review was threefold, namely to inform:
- the remaining nine months of programme implementation,
- how to continue promoting small-scale irrigation in Koshi province afterwards, and
- how the SDC can continue to support gender equality, social inclusion, and federal state building in the future.

Below, we offer the review's (substantiated) recommendations and possible follow-up actions. They are structured according to the above three bullet-points and distinct target audience.

6.1.1 The remaining nine months – for the SDC Nepal and the programme consultant

1. **To complete the construction of the planned small irrigation schemes.**
   To: The programme consultant (with endorsement of the SDC Nepal)
   Timeline: short-term
   Reason: To honor its commitments to local governments and reach (or exceed) its targets for the amount of agricultural land put under year-round irrigation and the increase in cropping intensity, land productivity, and vegetable production.
   Possible actions:
   - To implement the yearly plan of operation 2024-25 on the number of small irrigation schemes still to be rehabilitated.

2. **To include provincial and local government staff as full team members in the design and implementation of the remaining small irrigation schemes.**
   To: the programme consultant (with endorsement of the SDC Nepal)
   Timeline: short-term
   Reason: Provincial and local government staff will gain affinity with the Small Irrigation Guideline and the design and project preparation report system (software) and gain practical professional experience. This will enhance the capacity of provincial and local government staff which will allow the provincial and local government to better exert their constitutional roles and rights in agricultural irrigation (and, by setting an example, beyond). It will also allow the provincial government to continue the Small Irrigation Programme as a provincial government programme after the Small Irrigation Programme ends.
   Possible actions:
   - To include a team of provincial government staff and relevant local government staff as members of the programme's design teams, and for selected provincial government staff to also be part of the implementation, supervisory, and monitoring team. (Note: the local government staff are already involved in construction supervision and monitoring.)

3. **To determine which models are most promising for delivering effective (tailored) agricultural extension services to smallholder farmers.**
   To: the programme consultant (with endorsement of the SDC Nepal)
   Timeline: short-term
   Reason: The full benefit of having access to year-round irrigation has not been exploited. This requires smallholder farmers to adopt good irrigation and agricultural practices. For now, smallholder farmers were left with specific questions about the irrigation, cultivation, and pest control of vegetables. The Small Irrigation Programme have gained much experience and knows the Nepal landscape for agricultural extension services.
   Possible actions:
   - To develop alternatives models for complementing irrigation support with agricultural extension services (e.g., market, industry, provincial government, or local government based) and determine which is likely to be most effective in Koshi province.

6.1.2 Continuation after programme – for the provincial government

1. **To replicate the Small Irrigation Programme as a provincial government programme.**
   To: Ministry of Water Supply, Irrigation, and Energy of Koshi province
   Timeline: medium-term
   Reason: The provincial government has an NPR 1.5 billion budget to support (small scale) irrigation. Replicating the Small Irrigation Programme inserts additional purpose, structure and quality in how this budget is spent. It further defines the role of the provincial government in agricultural irrigation, namely as funder of, and knowledge hub for, local economic development (which is in line with the 2015 Constitution).
   Possible actions:
   - formally adopt a small irrigation programme like the Small Irrigation Programme,
   - institute a programme unit with key positions filled by provincial government staff and complemented by external project-based staff like the programme consultant.

6.1.3 On equality, inclusion, and federal state building – for the SDC Nepal

1. **To continue its affirmative action approach and complement it—during project implementation—with an anthropological study to determine and, if needed, respond to intra-group dynamics and opportunities.**
   To: the SDC Nepal
   Timeline: medium-term
   Reason: the affirmative action approach in selecting beneficiaries and structuring user committees works as it offers selected beneficiaries greater voice and agency, and better access to income opportunities. Neither women, nor discriminated groups, however, are homogenous groups. The selection of some women and discriminated groups in user committees, or different landholdings, can exacerbate intra-group inequalities during programme implementation. An anthropological study can keep tabs on intra-group dynamics, identify opportunities for further empowerment, and suggest action when intra-group dynamics / inequalities take a turn for the worse.
   Possible actions:
   - In evaluation, there is the concept of 'developmental evaluation'. This is an evaluation which takes place during and in parallel to project implementation. It is meant to directly feed into the strategic and operational decision making of the principal and implementing agency. In a similar vein, an anthropological study can be conducted to study intra-group dynamics, impacts, and opportunities.

2. **Besides structuring its projects according to the principles of the 2015 Constitution, to require implementing agencies to include provincial and local government staff as full team members in project implementation.**
   To: the SDC Nepal
   Timeline: medium-term
   Reason: it will ultimately be the capacity of the provincial and local governments which will determine their ability and success in performing their constitutional rights. Up to now, the Small Irrigation Programme has insufficiently engaged the provincial and local government staff in the design stage of the small irrigation schemes: a missed opportunity to build the requisite staff capacity 'on-the-job' and institutionalize the Small Irrigation Guideline standards and the programme's design and project preparation report system (software).
   Possible actions:
   - promote hybrid team of provincial and local government staff and external consultants,
   - be less ambitious, allow more time, and align program implementation to the available capacities of the provincial and local government to deliver (and grow their capacities).

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Appendices

SDC's assessment grid for the OECD/DAC evaluation criteria

Note: this assessment grid (Version: 11.06.2020) is used for evaluations of SDC / SECO financed projects and programmes. It is based on the OECD Development Assistance Committee evaluation criteria. In mid-term evaluations, the assessment requires analyzing the likelihood of achieving sustainability and, to a lesser degree, the likelihood of effectiveness and efficiency. All applicable sub-criteria should be scored, and a short explanation should be provided.

Please add the corresponding number (0-4) representing your rating of the sub-criteria in the column "score":

- 0 = not assessed
- 1 = highly satisfactory
- 2 = satisfactory
- 3 = unsatisfactory
- 4 = highly unsatisfactory

Key aspects based on DAC criteria	**Score** (put only integers: 0, 1, 2, 3 or 4)	**Justification** (please provide a short explanation for your score or why a criterion was not assessed)
Relevance		
1. The extent to which the objectives of the intervention respond to the needs and priorities of the target group.	2	The target group are, in practice, subsistence farmers with little land and income. They expressed a need for irrigation and took action to secure it. At the same time, most operate their farms as a cash cow, not as a (sustainable) business. Their goal is to offer their children a future outside agriculture. Because the actual priorities and needs of the beneficiaries differ from the implicit goal of the programme, namely to promote sustainable commercial agriculture, we rate the programme as satisfactory, rather than highly satisfactory.
2. The extent to which the objectives of the intervention respond to the needs and priorities of indirectly affected stakeholders (not included in target group, e.g. government, civil society, etc.) in the country of the intervention.	1	Local governments spent 5-20% of their investment budget on irrigation and/or agriculture (a top five priority). The provincial government spent close to CHF10 million per year on (small-scale) irrigation. Year-round irrigation is key for the federal government's goal to *'transform the agricultural sector into a competitive, climate resilient, self-reliant, and export-oriented industry'*. Given Nepal's topography, small scale irrigation can and must be part of the mix to transform the agricultural sector.
3. The extent to which core design elements of the intervention (such as the theory of change, structure of the project components, choice of services and intervention partners) adequately reflect the needs and priorities of the target group.	2	The primary objective of the programme was to provide smallholder farmers access to year-round irrigation. This worked. It helped local governments and smallholder farmers (organized in water user

		associations) to identify and design viable schemes, fund the construction material, train the smallholder farmers in construction, and jointly with local governments supervise the work. This reflected the initial needs of the beneficiaries. However, with access to irrigation, specific questions emerged about crop irrigation, cultivation practices, and disease control. The programme was not equipped to respond to these specific questions with tailored, specific, and concrete technical support. As a result, the programme did not fully exploit the opportunity for even greater increases in land productivity by combining irrigation with the introduction of good agricultural practices (and thereby enable itself to fully achieve its impact targets).
Coherence		
4. Internal coherence: the extent to which the intervention is compatible with other interventions of Swiss development cooperation in the same country and thematic field (consistency, complementarity and synergies).	0	The SDC and the intended users of the evaluation did not formulate evaluation questions about the programme's internal coherence. The purpose of the evaluation did not require such an analysis and assessment. Note: the collaboration of the Small Irrigation Programme with the Nepal Agricultural Market Development Programme was included in the effectiveness analysis as this was part and parcel of the programme theory.
5. External coherence: the extent to which the intervention is compatible with interventions of other actors in the country and thematic field (complementarity and synergies).	0	The SDC and the intended users of the evaluation did not formulate evaluation questions about the programme's external coherence. The purpose of the evaluation did not require such an analysis and assessment. The extent to which the programme was aligned to (coherent with) the policies and priorities of Nepal's federal, provincial, and local governments has been covered under relevance.
Effectiveness		
6. The extent to which approaches/strategies during implementation are adequate to achieve the intended results.	2	See point 3. In addition, the secondary objective of the SDC was to use the programme to strengthen the federal structure and functioning of government. Whilst the programme operated consistently with the 2015 Constitution, it could have integrated provincial and local government staff better into its activities. This would have enabled provincial and local government staff to 'learn-by-doing', built its capacities, replicate the programme, and set an example in how they can exert their constitutional rights and roles.
7. The extent to which the intervention achieved or is expected to achieve its intended objectives (outputs and outcomes).	2	The programme is likely to achieve most of its formal output and outcome targets, including—most importantly—the envisaged increase in agricultural land under irrigation, cropping intensity, land

		productivity, and vegetable production, as well as the number of beneficiaries, including those of disadvantaged groups. The programme falls somewhat short of its ambition to build capacities of provincial and local governments to exert their constitutional rights and roles, for the local governments to not only adopt but also implement the Small Irrigation Guideline, and for the local governments (or markets) to provide effective agricultural extension services (by at least one visit per grow seasons to each of the small irrigation schemes).
8. The extent to which the intervention achieved or is expected to achieve its intended results related to transversal themes.	2	The two key transversal themes are gender equality and social inclusion, and climate change. The programme ensured upfront the participation of women and representatives from disadvantaged groups. It met its formal targets and can, on these metrics, be considered 'GESI-positive'. Importantly, some women gained access to business opportunities stemming from the cultivation of vegetables, and voice/agency through their participation in the executive committee of the water user association. Representatives from disadvantaged groups who were members of the executive committee of water user associations felt equal and heard. The programme, however, did not keep tabs on possible emerging intra-group inequalities, stemming from the fact that not all could participate in the executive committees, had access to income opportunities, or because they had marginal landholdings. The beneficiaries' resilience to climate change—insofar this will induce changing weather patterns and more frequent landslides—was not really strengthened (over and above the fact that the rehabilitated irrigation schemes were solidly built structures). The smallholder farmers were left with questions about how to change their farming practices in the face of changing weather patterns and a general inability to repair the irrigation canals after landslides destroyed part of the canals.
Efficiency		
9. The extent to which the intervention delivers the results (outputs, outcomes) cost-effectively.	2	The cost-effectiveness of the programme was on par with a similar programme from the Asian Development Bank and industry standards. It also enjoyed a positive benefit-cost ratio in line with industry standards.
10. The extent to which the intervention delivers the results (outputs, outcome) in a timely manner (within the intended timeframe or reasonably adjusted timeframe).	2	The programme delivered most of its formal outcome targets related to agricultural irrigation on time. It, however, fell somewhat short on its envisaged impact within the project duration, and on building the

		capacities of local and provincial governments for them to be able to exert their constitutional role on small scale irrigation.
11. The extent to which management, monitoring and steering mechanisms support efficient implementation.	2	The programme was, to a large extent, implemented by the book (and, from a project management perspective, well). This ensured that the programme was able to deliver on some of its key outcome objectives on agricultural irrigation and production. Moreover, the programme had a good results matrix which combined indicators for steering and accountability. The programme advisory and coordination committees also posed relevant questions. The programme, however, insufficiently responded to these questions from the two governance committees or what its own monitoring data was telling it. In other words, it insufficiently steered and adapted the programme based on the feedback received.
Impact		
12. The extent to which the intervention generated or is expected to generate 'higher-level effects' as defined in the design document of the intervention.	1	The increase in cropping intensity, land productivity, and (vegetable) production allowed smallholder farmers to increase their income, improve their livelihoods, better meet critical expenditures, and send their children to better (private) boarding schools. Whilst the income gain was slightly below the (very ambitious) target, these impacts were real, highly appreciated, and making a real difference in the lives of the smallholder farmers.
Sustainability		
13. The extent to which partners are capable and motivated (technical capacity, ownership) to continue activities contributing to achieving the outcomes.	1	The key partner here is the smallholder farmers. We answer this criterion not by their capability and motivation to ‘achieve’ the outcomes, but rather to ‘sustain’ the outcomes. As noted above, the smallholder farmers took action to initiate and secure access to year-round irrigation. They constructed and maintained the small irrigation schemes and have enjoyed the benefits thereof. Their capacity and ownership is high.
14. The extent to which partners have the financial resources to continue activities contributing to achieving the outcomes.	2	The smallholder farmers do not generate enough revenue to maintain and repair the small irrigation schemes. The provincial and local governments can step in, but—given the limited fiscal decentralization—are financially constrained as well. As such, a combined funding structure like the Small Irrigation Programme and involvement of the federal government is key.
15. The extent to which contextual factors (e.g. legislation, politics, economic situation, social demands) is conducive to continuing activities leading to outcomes.	3	The national political context in Nepal is highly fragile which permeates down to the provincial and local level. This is not conducive for result- and learning-oriented sector development.

Volume II

JaLogisch Consulting GmbH
development evaluation with global reach

External review of the Small Irrigation Programme, Phase II

Volume II: Appendices (Final, 2 October 2024)

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Date:
2 October 2024

Evaluation period:
May – September 2024

Client:
Federal Department of Foreign Affairs
Swiss Agency for Development and Cooperation SDC
Swiss Cooperation Office Nepal

Front page photo credits:
The Blue Marble, Visible Earth, NASA

Table of Contents

Abbreviations and acronyms

CHF	Swiss franc
DAG	Disadvantaged groups
ha	hectare
LG	Local government
MoWSIE	Ministry of Water Supply, Irrigation, and Energy, Koshi Province
NAMDP	Nepal Agricultural Market System Development Programme
NPR	Nepali Rupee
OECD/DAC	Organization for Economic Cooperation and Development/Development Assistance Committee
PAC	Programme Advisory Committee, SIP
PCC	Programme Coordination Committee, SIP
PIC	Programme Implementation Committee, SIP
SDC	Swiss Agency for Development and Cooperation
SIP	Small Irrigation Programme, Phase II, Nepal
SIS	Small irrigation scheme
WUA	Water user association

A Review questions

Relevance

1. To what extent was SIP II aligned with the needs, demands, policies and priorities of the recipient country, target groups, and Switzerland and how did it respond to changes in the political economic context?

Effectiveness and impact

2. Is federalization of irrigation moving in the right direction (in terms of the execution of the constitutional mandates on agricultural irrigation, the requisite policy framework, and institutional capacity and capability)?
3. Should the endorsement of the Federal Civil Services Act have been a conditionality before the start of the phase?
4. To what extent have the intended impacts and outcomes of the programme been achieved or are likely to be achieved by the end of the phase (both on paper and on-the-ground) and how has the SIP contributed to the realized impacts and outcomes (including what worked, what didn't, and why)?
5. How effective was the mainstreaming of gender equity and social inclusion in the programme institutions, implementation, outcomes, and impacts?
6. How effectively were the environmental and climate change considerations taken up in the irrigation system construction?

Efficiency

7. To what extent was the SIP cost-effective, i.e., what was the net benefit-cost ratio and how does the total cost per beneficiary compare with similar interventions by other development partners, and were the outputs and outcomes delivered in time?
8. How efficient were the governance, management, implementation, and monitoring of the SIP, in particular the functioning of the Programme Advisory Committee, the Programme Coordination Committee, the Programme Implementation Committee at the local government level, and the programme team (including the latter's ability for self-reflection and adaptation)?

Sustainability

9. To what extent are the net benefits of the intervention likely to continue after the project end (with regard to the small irrigation schemes, the water user associations, and the ability of the local and provincial governments to support continued expansion of small-scale agricultural irrigation, including analysis of contributing and hindering factors)?

Overall

10. What are the conclusions, lessons, and recommendations from SIP II pertaining to (i) the three main objectives of the review?

B Evaluation design matrix

Evaluation questions	Judgement criteria/dimensions	Data collection methods	Data sources	Data analysis methods
Relevance				
1. To what extent was SIP II aligned with the policies and priorities of the recipient country, target groups, and Switzerland and how did it respond to changes in the political economic context?	– OECD/DAC criteria relevance: alignment with the respective policies and priorities of the Government of Nepal and Koshi Province, whereby policies reflect stated intentions, and priorities lived experience. – Target group expressed needs and demands and lived priorities. – Changes in the development and political context and recorded changes in SIP.	– Document review – Key informant interviews	**Documentation**: – Nepal constitution – Unbundling report – 15Th National Plan – Periodic Plan of Koshi Province 2076/77-2080/81 – Swiss Cooperation Programme 2023-26 **Key informants**: – Ministry of Urban Development/Doli – Ministry of Energy, Water Resources, and Irrigation – Ministry of Water Supply, Irrigation and Energy (Koshi Province) – Local governments – Water user associations – Smallholders (incl women and DAG) – Swiss Embassy – SIP	– Inductive and deductive analysis
Effectiveness and impact				
2. Is federalization of irrigation moving in the right direction (in terms of the execution of the constitutional mandates on agricultural irrigation, the requisite policy framework, and institutional capacity and capability)?	– The constitutional provisions on small-scale agricultural irrigation and the empowerment of the provincial and local governments to execute these constitutional mandates.	– Document review – Key informant interviews	**Documentation:** – Nepal constitution – Unbundling report (including currently ongoing review) – Provincial civil service act – Small irrigation guideline – Local government irrigation and water usage plans – Other relevant policies **Key informants**: – Ministry of Energy, Water Resources, and Irrigation	– Inductive and deductive analysis – Contribution analysis

Evaluation questions	Judgement criteria/dimensions	Data collection methods	Data sources	Data analysis methods
			– Ministry of Water Supply, Irrigation and Energy (Koshi Province) – Swiss Embassy – Independent (academic) irrigation, constitution, and governance experts	
3. Should the endorsement of the Federal Services Act have been a conditionality before the start of the phase?	– Requisite and actual human resources and institutional capacity at the provincial and local government level (Qualitative assessment).	– Document review – Key informant interviews	**Documentation**: – Draft federal services act **Key informants**: – Same as above	– Inductive and deductive analysis – Contribution analysis
4. To what extent have the intended impacts and outcomes of the programme been achieved or are likely to be achieved by the end of the phase (both on paper and on-the-ground) and how has the SIP contributed to these impacts and outcomes (including what worked, what didn't, and why)?	– SIP results framework – SIP theory of change	– Document review – Key informant interviews – Socio-economic impact survey	**Documentation**: – Baseline study – Latest annual report – Latest outcome monitoring summary / programme monitoring data – Crop-cut survey – Field survey results – Self-evaluation report – Nepal's Multidimensional Poverty Index – Irrigation Master Plan, Water Resource Project Preparation Facility – Population census data **Key informants**: – Ministry of Water Supply, Irrigation and Energy (Koshi Province) – Palika: officials, technicians, extension workers – Water user associations – Smallholders (including women and DAG) – Agrovet centers/markets – SIP **Survey respondents:**	– Comparative analysis – Inductive and deductive analysis – Contribution analysis

Evaluation questions	Judgement criteria/dimensions	Data collection methods	Data sources	Data analysis methods
			– Sample of smallholder beneficiaries (including women and DAG)	
5. How effective was the mainstreaming of gender equity and social inclusion in the programme institutions, implementation, outcomes, and impacts?	– SDC Nepal GESI framework	– Document review – Key informant interviews – Socio-economic impact survey	**Documentation**: – SDC Nepal GESI framework **Key informants**: – Same as above **Survey respondents:** – Sample of smallholder beneficiaries (including women and DAG)	– Inductive and deductive analysis
6. How effectively were the environmental and climate change considerations taken up in the irrigation system construction?	– CEDRIG assessment	– Document review – Key informant interviews – Socio-economic impact survey	**Documentation**: – CEDRIG assessment **Key informants**: – Same as above **Survey respondents:** – Sample of smallholder beneficiaries (including women and DAG)	– Inductive and deductive analysis
Efficiency				
7. To what extent was the SIP cost-effective and were the outputs and outcomes delivered in time?	– The total costs per beneficiary compared with similar interventions by other development partners – Time-plan Programme Document and amendments – Extent to which a different allocation of funds could have achieved better results	– Document review – Key informant interviews	**Documentation**: – Expenditure data – Latest outcome monitoring summary / programme monitoring data – Programme document workplan **Key informants**: – SIP – ADB, USAID – Other development partners	– Comparative analysis – Inductive and deductive analysis – Follow-the money approach
8. How efficient were the governance, management, implementation, and monitoring of the SIP, in particular the functioning of the Programme Advisory Committee, the Programme Coordination Committee, the Programme Implementation Committee at the local government level, and the programme team (including the latter's ability for self-reflection and adaptation)?	– The ability of the different governance bodies and the programme team to respond to results, opportunities, synergies, and changes in the development context and contribute to results achievement (qualitative assessment)	– Document review – Key informant interviews	**Documentation**: – Programme document – Annual reports – Meeting minutes – MERV **Key informants**: – Ministry of Energy, Water Resources, and Irrigation	– Inductive and deductive analysis

Evaluation questions	Judgement criteria/dimensions	Data collection methods	Data sources	Data analysis methods
			– Ministry of Water Supply, Irrigation and Energy – Local governments – Swiss Embassy – SIP	
Sustainability				
9. To what extent are the net benefits of the intervention likely to continue after the project end (with regard to the small irrigation schemes, the water user associations, and the ability of the local and provincial governments to support continued expansion of small-scale agricultural irrigation, including analysis of contributing and hindering factors)?	– The capacity, capability, financial resources, incentive, interest, and tenacity for the WUAs to maintain the small irrigation schemes and for the local and provincial governments to continue promoting and funding small-scale agricultural irrigation	– Document review – Key informant interviews – Socio-economic impact survey	**Documentation**: – Periodic Plan of Koshi Province 2076/77-2080/81 – Review unbundling report – Draft federal civil service act – Provincial civil service act – Small irrigation guideline – Local government irrigation and water usage plans – Short-term monitoring survey irrigation schemes 2020-21 **Key informants**: – Ministry of Energy, Water Resources, and Irrigation – Ministry of Water Supply, Irrigation and Energy – Palika: officials, technicians, extension workers – Water user associations – Smallholders (women / DAG) – Agrovet centers – SIP **Survey respondents:** – Sample of smallholder beneficiaries	– Inductive and deductive analysis – Contribution analysis
Overall				
10. What are the conclusions, lessons, and recommendations from SIP II pertaining to the three main objectives of the review?	– Inductive and deductive analysis based on the answers to the first nine evaluation questions	– n/a	– the answers to the first nine evaluation questions	– Inductive and deductive analysis

C The programme theory

If SIP, together with the provincial and federal sphere of government, help:

- **local governments**, located in the mid-hills of Koshi Province, to:
  - prepare irrigation and agricultural development plans and municipal policies,
  - plan, design, and supervise the construction and maintenance of small irrigation schemes,
  - offer smallholder producers agricultural extension services and marketing support, and
- **smallholder producers**, located in these local municipalities, to:
  - organize themselves in an inclusive and equitable manner in water user associations (WUAs),
  - formally register the WUAs, and set-up the requisite constitution, procedures, processes, contributions, record keeping, and water management plans,
  - plan, design, construct and maintain small irrigation schemes, and
    if SIP, together with the NAMDP, build smallholders' capacity to:
  - source agricultural inputs from input traders, and
  - sell the produce to the commercial markets (activities / outputs),

then:

- **smallholder producers** will gain access to year-round irrigation, increase their cropping intensity and land productivity, shift to higher-value crops, sell their surplus of produce to commercial markets (outcomes), increase their annual income from land cultivation, and—through productive reinvestments of this additional income—enhance their overall income (including from livestock and fisheries) (impacts), and
- **the federal, provincial, and local government** gain practical and concrete experience in implementing the constitution (outcome), thereby strengthening the functioning of the federal state, and fostering stability and development (impact)

because:

- **local governments** will respond positively to the support because:
  - small-scale irrigation is their exclusive mandate under the constitution,
  - local governments will implement a one-window approach for all its offerings
  - local governments have been selected which are committed and have budgeted,
  - local governments have the willingness, and gained the capacity,
  - local governments have the incentive to put in funds as NPR 1 will leverage an additional NPR 4 from the federal and provincial government and the SDC,
- **smallholder producers** will respond positively to the support because:
  - the support reduces the risk associated with running a water user association and communal irrigation schemes,
  - they gain access to irrigation which allows them to automatically increase land productivity (by 30%) and their cropping intensity,
  - allowing them to produce more, sell more, and increase their agricultural income, as,
  - the offtake markets are there, and the smallholders can access the requisite agricultural inputs,
- **the provincial government** of Koshi province will:
  - develop a uniform a small irrigation guideline for the perusal of local governments, and
  - take over the semi-automated design and project preparation report system from SIP to allow for replication and ensure sustainability upon SIP completion, and
  - provide 20% of the funding to the construction of the small irrigation schemes to support economic growth in the province, and
- **the federal government** of Nepal will:
  - contribute 20% of the funding to the construction of the small irrigation schemes,
- **federal, provincial, and local government** will effectively coordinate their work and contributions through the programme coordination and programme advisory committees,
- **the sustainability** of the irrigation schemes is ensured with an operations and maintenance fund: an upfront cash-contribution of beneficiaries and annual water usage fee.

D Evaluation methods

Document review

The purpose of the document review was to:

- understand the design, scope, and intent of the Small Irrigation Programme,
- reconstruct the SIP theory of change,
- collect stories and data on the development effectiveness of the programme, and
- contextualize the results against the development context in Koshi province.

The scope of the document review can be gleaned from the evaluation design matrix. It covered (i) programme documents, (ii) federal, provincial, and local government acts, strategies, policies, and plans, (iii) the SDC cooperation programme, and (iv) sector studies.

Field survey

The purpose of the field survey was to assess the extent to which the impacts and outcomes, as defined in the SIP results framework, are likely to be achieved by the end of phase II of the Small Irrigation Programme. The survey was conducted by IOD Parc. Appendix E details the survey approach and methodology.

Key informant interviews during the field mission

The purpose of the key informant interviews was to:

- discuss in-depth the main themes/questions of the evaluation,
- collect qualitative information on the development effectiveness of the programme,
- follow-up on key findings from the socio-economic impact survey, and
- reflect on and draw out the main lessons learned from the programme implementation.

The key informant groups can be gleaned from the evaluation design matrix. They cover all programme stakeholder and beneficiary groups, as well as independent experts and development partners. We conducted semi-structured interviews. Based on the evaluation questions, we prepared a questionnaire for the interviews (capturing all important topics). We started the actual interviews in an open, non-judgmental fashion and invited each interview partner to express their involvement, experiences, and views freely. This provided unbiased answers, tending to cover (roughly) 30% of the interview questions and provided insight into which other questions were likely to receive informative answers (often another 20 – 30% of the questions). Gradually, we then focused the interviews on the remaining relevant questions from the underlying questionnaire as well as on emerging themes from the evaluation.

Data analysis methods

The evaluation applied various data analysis techniques for answering the questions:

- **inductive analysis**: 'making sense' of the collected data during the data collection (for example the field mission) and identify 'emerging themes and patterns',
- **deductive analysis**: 'a structured analysis' of the collected data to specifically answer the evaluation questions,
- **quantitative analysis**: a comparative analysis of baseline, field survey, and target data on the agricultural production, sales, and income of smallholders,
- **contribution analysis**: a structured and qualitative inquiry to ascertain to what extent the programme 'contributed' to the observed results or whether other contextual factors where responsible,
- **follow-the-money analysis**: based on the expenditure profile and drawing on the results of the contribution analysis, to assess whether—with hindsight—better results could have been achieved through a different allocation of resources, and
- **triangulation**: findings and conclusions rest on data stemming from different categories of data sources and consensus amongst the evaluators.

E Field survey design and approach

Purpose

To determine the impact of the rehabilitated small irrigation schemes on the income of the beneficiary smallholder farmers.

Approach

To inquire amongst a representative sample of beneficiary smallholder farmers into their income from land cultivation, livestock, and fisheries before and after the rehabilitation of the small irrigation schemes, allowing a 'before-after' analysis.

Survey questions

The survey questions were derived from the results matrix of the Small Irrigation Programme, i.e., the questions were geared to gathering data on the outcome and impact indicators of the Small Irrigation Programme. IOD Parc and the enumerators thought smallholder farmers were unlikely to be able to list their total (agricultural) income. They, therefore, decided to breakdown the questions to the level of individual crops and agricultural activities. The total change in income was subsequently calculated by aggregating the income from individual crops and agricultural activities.

Scope

The inquiry was limited to the small irrigation schemes (and its beneficiaries) completed within the first three years of the Small Irrigation Programme. With the survey having been conducted after year four, all respondents had at least one year of land cultivation after the rehabilitation of the small irrigation scheme.

Sample size

The sample size of 501 smallholder farmers was determined through a so-called 'power calculation'. This is a statistical method to determine the required sample size, i.e., to ensure that the estimate of the 'impact on income' is sufficiently precise to make statistically relevant claims. In other words, that the survey has a high probability (power) of detecting a true effect if it exists. Table 1 shares the power calculation, including underlying definitions.

Table 1 Power calculation

Parameter	Value	Definition
α	0.05	significance level
β	0.8	desired power of test
Tail	2	one-tailed or two-tailed test
n_{min}	500	The minimum sample size decided beforehand to determine t values
σ_y	99655	The pooled total standard deviation of the estimated effect on the outcome variable
P	0.5	The proportion of the study that is randomly assigned to the treatment group
δ	25000	Minimum detectable effect
t_1	1.96	T-value corresponding to the desired significance level of the test
t_2	0.84	T-value corresponding to the desired power of the design
n	501	

Sampling

The smallholder farmers are organized in water user associations / small irrigation schemes. In the Small Irrigation Programme, there are between 9 and 150 households per scheme (in the first three years of the programme). The industry standard is to select 10 to 20 households per 'cluster'—in our case, per 'small irrigation scheme'. This ensures that one captures the average experience. More is not deemed efficient as the other beneficiaries in the cluster / scheme are likely to have the same experience. As the number of smallholder farmers per scheme is relatively small and to ensure the inclusion of as many possible different schemes,

we chose the bottom-end of this range, i.e., 10 beneficiary smallholder farmers per scheme. This resulted in 50 small irrigation schemes within which to conduct the survey (501/10 = 50).

The individual schemes were selected using the 'probability proportional to size approach'. This sampling method ensured that each beneficiary household had an equal chance of being selected for the survey. It was also ensured that schemes were selected from all three north-south river corridors of Koshi province.

The 10 beneficiary households within a small irrigation scheme were selected through stratified random sampling, ensuring equal representation of the head, middle, and tail-end of the irrigation scheme. The selection of beneficiary households was done based on the listings from the Small Irrigation Programme. These lists were drawn up at the time of the scheme design and proved, at times, to be outdated. When selected households were not present or no longer cultivating their land, the enumerators discussed with the chairperson of the water user association and jointly selected an alternative member / beneficiary household.

Enumerators

The survey was conducted by 6 independent and experienced enumerators from Koshi province. Each enumerator was assigned 5 to 12 schemes within a single administrative district and had 7 to 10 days to complete the survey. The enumerators received a one-day training on the survey questionnaire and the interviewing approach.

Platform

The survey was conducted on the survey platform Kobo Toolbox which is accessible and initiative to use, allows for detailed survey designs (including routing), offline data collection on mobile devises, and secure data transmission, supports multilingual surveys, and allows for data migration to Microsoft Excel for further data processing and analysis.

Data cleaning and analysis

Data cleaning, quality assurance, and some data analysis was conducted by IOD Parc. It subsequently shared the raw data with the evaluation team, which conducted the majority of the data analysis (as can be found in Appendix H).

F Sampling strategy field mission

SIP targeted the rehabilitation, extension, or greenfield construction of around 1,300 small irrigation schemes. In practice, the bulk of the supported irrigation schemes concerned the rehabilitation and modernization of gravity-based, run-of-the-river, small irrigation schemes. Some contained water storage solutions, with only a handful having bigger collection chambers for water storage. SIP has to date not supported pump-based irrigation schemes.

The review concentrated on the 686 small irrigation schemes which were completed in the first three years of the programme and have therefore been 'in operation' for at least one-year, allowing the beneficiaries to have enjoyed at least one-year of benefits. These 686 small irrigation schemes were located in 59 palikas in eight districts in Koshi Province. All schemes are situated in the mid-hills of Koshi Province. The programme has organized the palikas in three North-South corridors (Mechi, Koshi, and Sagarmatha/Dudhkoshi) and five clusters. The schemes are to ultimately benefit around 48,000 households.[1] 40% of households should be from disadvantaged groups and 70% should have landholdings below 0.5 ha.

The current 'population' (686 irrigation schemes, 59 palikas, eight districts, five clusters, and three corridors, benefiting 30,008 smallholder households) allowed us to draw a stratified random sample of small irrigation schemes for the field survey (see Appendix E). For the field mission, we resorted to purposeful sampling to carefully balance the selection of schemes which were:

- close or distant to local and regional market centers,
- located in urban versus rural municipalities,
- from different corridors, clusters, and districts,
- credible in the eyes of the SDC and the programme consultant, and
- could be visited within the 9 days spent in Koshi Province.

This resulted in the selection of the following 4 local governments and 7 small irrigation schemes:

- Suryodaya Municipality
  - Ramekhola SIS
- Yangwarak Rural Municipality
  - Siwakhola SIS
- Chhathar Jorpati Rural Municipality
  - Puchhar Kulo SIS
- Mahalaxmi Municipality
  - Leguwabeltar SIS,
- Plus:
  - Malbase SIS, Ilam Municipality
  - Chiurebote SIS, Dhankuta Municipality
  - Paua Khola Muhan Gari Phalate Tallo Kulo SIS, Nepaltar Municipality

[1] SIP originally targeted 65,000 households. This assumed that average landholdings in the target area were 0,31 ha. The baseline survey suggested that average landholdings were 0,41 ha. Based on the fixed target of 20,000 ha of irrigated land, this automatically results in less household beneficiaries.

G Outcome monitoring summary for 2023-24 (from SIP)

Indicators	Phase Target	Target 2023/24	Result 2023/24	Phase Cumulative results	Key success and constraints	Priority measures/steering decision
Outcome 1: Local Governments (LGs) respond effectively to the needs of small farmers for irrigated agriculture						
100% LGs have established a one window system	100% LGs	36% LGs	36% LGs	100% LGs	• The draft of the small irrigation guideline that was shared in 2022 by MoWSIE has been adapted and officially endorsed by all working LGs. • Project team's continuous engagement at both political and programmatic level resulted in 100% endorsement. • However, enforcement of the guideline to ensure one-window system is yet to be operationalized.	• Meeting with LGs to discuss implementation of the guideline, including establishing indicators for SIG compliance.
35% increase in additional area under year-round irrigation in participating LGs	35% increase (20,000 ha)	14% (8,029 ha)	10% (5,574 ha)	32% (18,227)	• 19 schemes are physically completed; however, payment remains pending due to budget deficiency. • 51 schemes could not be completed within the fiscal year due to budget deficits of the province government. • However, funding for these schemes in the next fiscal year has been secured to cover the full financial liability from respective source. • Five schemes (142 ha) were dropped due to socio-political issues.	• Consult with all users during pre-construction activities to ensure meaningful participation and effectively address any disputes.

Indicators	Phase Target	Target 2023/24	Result 2023/24	Phase Cumulative results	Key success and constraints	Priority measures/steering decision
100% schemes have received at least one visit of a rural advisory services provider during the production cycle	100% (1,300 schemes)	100% (448 schemes)	86% (333 out of 388 completed schemes)	67% (717 out of 1,074 completed schemes)	• Engagement at both political and programmatic level has led to an annual increment in access to rural advisory services by WUAs, despite human resource constraints in LGs. • Further, WUAs also received advisory services from the partnership under joint collaboration between SIP/NAMDP. • WUAs benefited from both private and public services however, this remains undocumented.	• Records of services from private sectors will be documented during the end-line assessment.
Outcome 2: Small farmers especially from DAGs increase agricultural productivity						
65'000 HHs benefited from year-round and increased irrigation water	65,000 HHs	17,903 HHs	14,870 HHs	44,878 HHs	• Delay in project implementation due to budget deficits and socio-political issues has resulted in lower achievement of targets. • It is expected that the total beneficiary households for the entire phase will be around 60,360 including households which will benefit in the next FY. This will be 7% lower than the phase target. • One of the reasons for this is the assumption of 0.31-hectare average land holding per household in Koshi Province to calculate the phase target of 65,000. • SIP database indicates that on an average the landholding of a household is 0.42 hectare of land.	

Indicators	Phase Target	Target 2023/24	Result 2023/24	Phase Cumulative results	Key success and constraints	Priority measures/steering decision
40% beneficiaries are from DAGs	40% (26,000 HHs)	40% (7,161 HHs)	47% (6,939 HHs)	45% (20,043 HHs)		
70% of the program beneficiaries have a landholding of less than 0.5 ha in SIP command area.	70% (45,500 HHs)	70% (12,532 HHs)	69% (10,188 HHs)	63% (28,220 HHs)	The target on small landholders could not be achieved since criteria of small landholders during schemes selection is not always prioritized by LGs.	
30% increase in the yields of major irrigated food crops in SIP command area.	30% increase	30% increase	• Monsoon Paddy increased by 33% (Baseline: 3.56 t/h; Achieved: 4.73 t/h) • Wheat increased by 9% (Baseline: 2.09 t/h; Achieved: 2.48 t/h) • Spring Maize (analysis ongoing)	Not applicable	• The result is based on the crop cut survey conducted in 94 schemes for monsoon paddy in November-December 2023 and 24 schemes for wheat in March-April, 2024. • Unavailability of quality seeds and fertilizers for wheat cultivation was a major constraint.	Engage with LGs and PG to ensure timely supply of quality seeds and fertilizers to farmers through government grant and private sector sources.

Indicators	Phase Target	Target 2023/24	Result 2023/24	Phase Cumulative results	Key success and constraints	Priority measures/steering decision
30% increase in cropping intensity in SIP command area	30% increase	30% increase	39% increase (Baseline: 160% Achieved: 223%)			Data for maize yet to be included.
Winter vegetable production and other high value crops increases by a minimum of 50% (by volume) above the current total production in SIP schemes	Min. 50% increase in production volume in completed schemes	Min. 50% increase in production volume in completed schemes	86% increase (Baseline: 78,105 t Achieved: 145,220 t)	Not applicable	• With improved water reliability, farmers have expanded their crop area by 35%, resulting in a corresponding increase in production volume. • The crop cut survey for winter vegetable includes potato, cabbage and cauliflower.	
90% of the program's irrigation schemes are functioning well three years post-completion.	90% schemes	90% schemes	97% schemes	Not applicable	• Short term monitoring conducted in the 32 schemes completed in FY 2020-21 validates that 97% schemes are fully operational. • One scheme in Likhu Rural Municipality, Okhaldhunga is partially operating as its' intake was damaged during road construction.	• Engage with LG to restore the intake once the road construction work is completed.
At least 80% of WUAs establish a fund for Operation &	80%	80%	100%	100%	• As there is a mandatory 1% upfront cash contribution for O&M funds, WUAs have established a fund for the same.	• Provide timely O&M training to the remaining schemes to equip farmers with essential

Indicators	Phase Target	Target 2023/24	Result 2023/24	Phase Cumulative results	Key success and constraints	Priority measures/steering decision
Maintenance and major repairs, through the equitable collection of water service fees					• However, as indicated by the STM survey of schemes completed in FY 2020-21, WUAs do not collect O&M fees regularly as they rely on traditional practices for O&M.	skills and knowledge on operation and maintenance. • Work with LGs to establish an O&M policy, linking it to prerequisite conditions for distributing agriculture related grants to farmers.
Outcome 3: Market actors offer innovative supports and products to farmers in irrigated schemes						
50% of WUA that have contracted at least one input provider in the last 12 months	50% (650 out of 1,300 WUAs)	50% (224 out of 448 WUAs)	-	-	• As recommended by the self-evaluation report, for indicator 3.1 rather than the percentage of WUAs that have contracted a service provider, SIP will provide number and types of services that input market providers (such as private agro-vets) have offered to WUA members in selected schemes. • Hence, six market partners under SIP/NAMDP joint collaboration provided input services such as seeds, fertilizer, plastic tunnel, pesticides, machinery/kits, crate, jute sacks, soil testing to farmers. • However, the services received from other input market providers (such as private agro-vets) at WUA level is yet to be recorded.	• Orient WUAs to record the received services on time and follow up from PMISC team. • Inputs received from traders will be collected during the end-line survey.

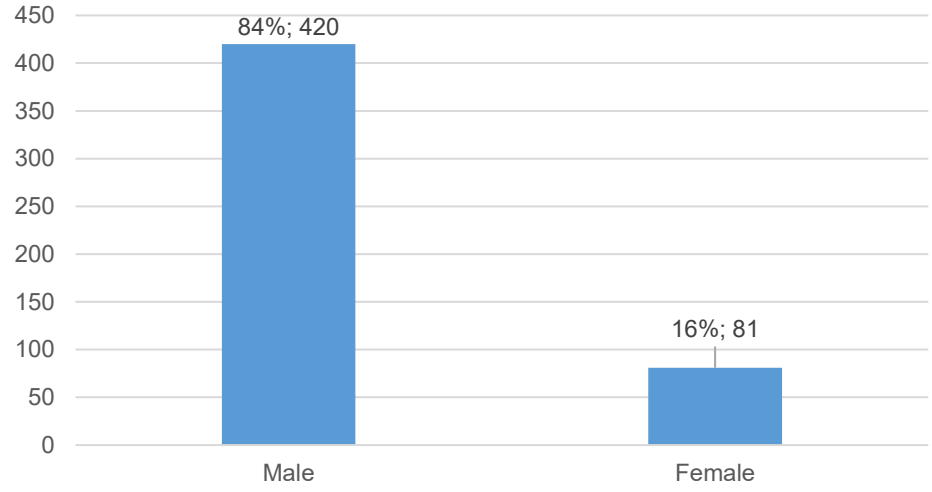
Indicators	Phase Target	Target 2023/24	Result 2023/24	Phase Cumulative results	Key success and constraints	Priority measures/steering decision
50% of SIP schemes that have established contracts with traders or wholesalers to buy their crops	50% (650 out of 1,300 WUAs)	50% (224 out of 448 WUAs)	-	Not applicable	• As recommended by the self-evaluation report, for indicator 3.2, SIP collect the volume sold from sample schemes to output market traders or aggregators rather than the percentage of schemes establishing contracts. • Through joint collaboration, 1,700 farmers from 115 irrigated schemes with market development potential sold 720 metric tonnes of agricultural products, worth NPR 23.8 million, to seven traders/wholesaler. • However, sales records for transactions with other market actors hasn't been recorded.	• Comprehensive sales records will be collected during the end-line survey.

Indicators	Phase Target	Target 2023/24	Result 2023/24	Phase Cumulative results	Key success and constraints	Priority measures/steering decision
70% of beneficiary farmers sell part of their irrigated agriculture production directly to the market	70% farmers	Not applicable	Not applicable	Not applicable	47% sampled beneficiary households sold part of their irrigated agriculture production directly to the market according to the baseline study conducted in FY 2021-22.	End line survey is planned for final FY.

H Field survey data and results

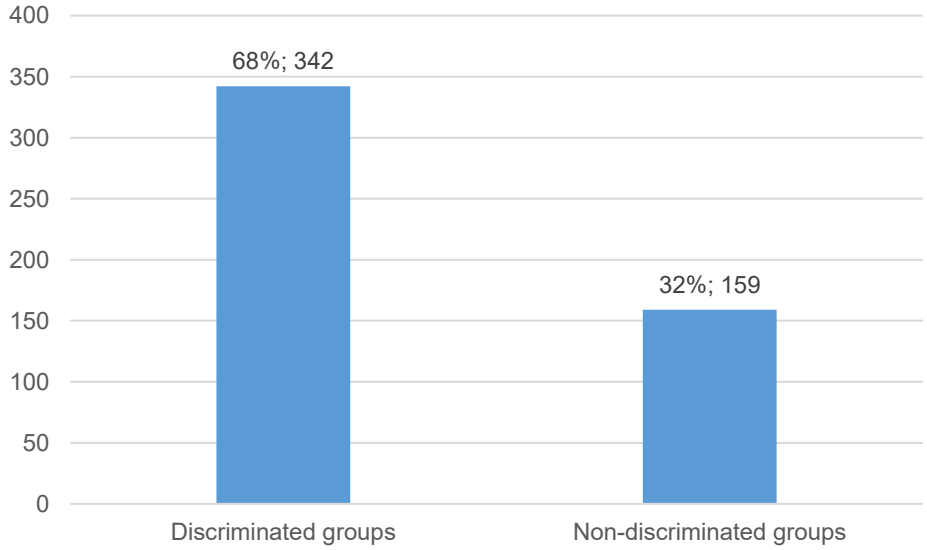
Population data

*Figure 1 Gender split survey population**



* The random sample of households within each irrigation scheme, mistakenly, did not differentiate between gender, resulting in this skewed gender balance amongst the survey respondents.

Figure 2 Number and percentage of discriminated households in survey population



Land cultivation income data

Table 2 Average income from land cultivation before and after SIS

	Average income land cultivation total population	Percentage of farmers with cash income from land cultivation	Average income land cultivation farmers with cash income
Before SIS	NPR 44.106	49%	NPR 90.934
After SIS	NPR 57.462	54%	NPR 106.623
Change	30%	+ 6% point	17%

Figure 3 Income distribution from land cultivation before SIS

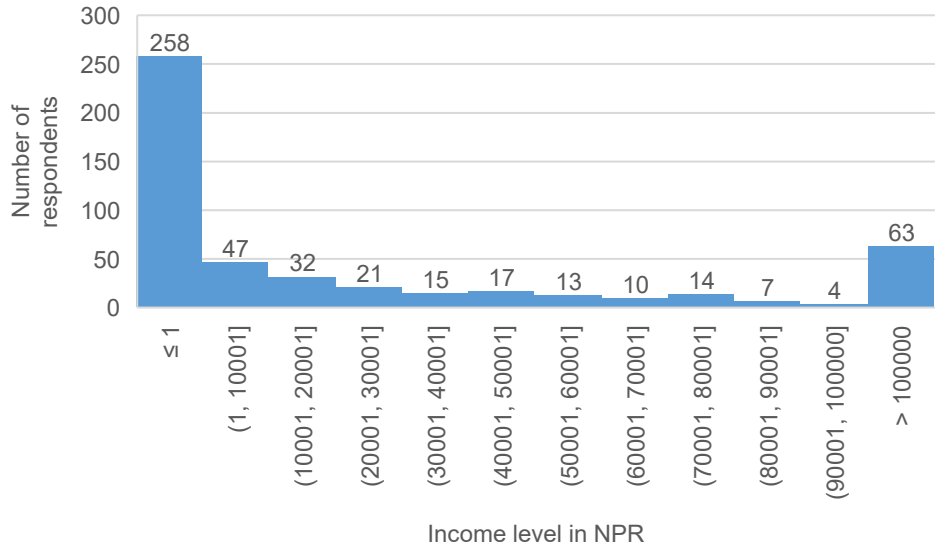
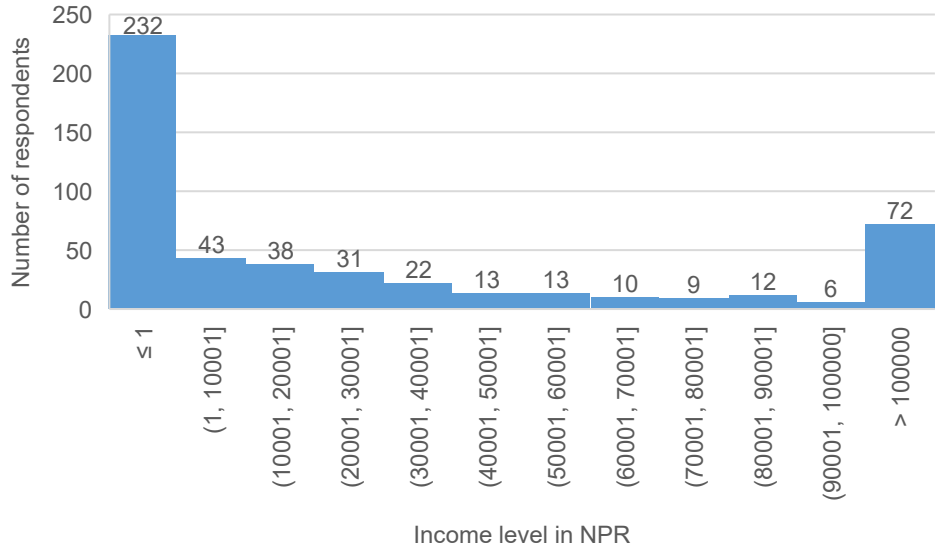


Figure 4 Income distribution from land cultivation after SIS



Agricultural income data

Table 3 Agricultural income data before and after the SIS

	Average income land cultivation total population	Average income livestock & fisheries	Agricultural income	Average remittances
Before SIS	NPR 44.106	NPR 23.059	NPR 67.165	n/a
After SIS	NPR 57.462	NPR 52.418	NPR 109.880	NPR 140.758
Change	30%	127%	64%	n/a

Table 4 Reasons for changes in agricultural income

Fluctuating market price	Change in production quantity	Reliable market	Easy availability of agricultural input	Others
413	305	72	79	18

Legend: number of responses

Table 5 Reinvestment of agricultural income

	Yes	NO	In cash crops	In livestock	In others
Reinvestment of agricultural income	287	214	193	42	52
	57%	43%	67%	15%	18%

Table 6 Contribution of cereal and vegetables crops to income after the rehabilitation of the SIS

	After SIS	Share
Total income from land cultivation	NPR 28.788.300	
Total income from cereal production	NPR 2.276.500	8%
Total income from vegetables and other crops	NPR 26.511.800	92%

Value of home consumption

Table 7 Percentage of production sold to the market – cereals

	Paddy		Wheat		Maize			
	Before	After	Before	After	Before	After		
Produced (in KG)	317300	365500	19700	24700	134300	154300		
Sold (in KG)	31300	31000	600	1100	8400	10400	Total after	42500
Percentage of production sold	10%	8%	3%	4%	6%	7%	**Weighted average**	**8%**

Table 8 Percentage of production sold to the market – vegetables

	Potatoes		Cauliflower		Tomatoes		Other vegetables		Round chillies			
	Before	After	Before	After	Before	After	Before	After	Before	After		
Produced (in KG)	76600	92900	9707	14380	5325	14722	3105	16375	1137	2384		
Sold (in KG)	24460	28322	7440	10605	2880	10710	1750	11415	740	1499	**Total after**	62551
Percentage of production sold	32%	30%	77%	74%	54%	73%	56%	70%	65%	63%	**Weighted average**	53%

Table 9 Value of home consumption at market prices

	Value
Average income increase households	NPR 13.356
Contribution vegetables and others (92%)	NPR 12.300
Contribution cereals (8%)	NPR 1.056
Value home consumption cereals (home-consumption/market sales = 92%/8%)	NPR 12.146
Value home consumption vegetables and others (home-consumption/market sales = 47%/53%)	NPR 10.907
Total value home consumption	**NPR 23.053**

Cropping intensity

Table 10 Increase in total cultivated land

	Average area of cultivated land before the SIS (in and outside the scheme)	Average area of cultivated land after the SIS (in and outside the scheme)
Average per household in hectares	0,83	0,97
Change		18%

Table 11 Reasons for changing land area under cultivation

	Change in land area under cultivation	Number of responses	Percentage
Positive	Change in water availability	446	33%
	Availability of seeds and fertilizers	141	10%
	Information of agricultural technology	44	3%
	Easier to sell	29	2%
Negative	Shortage of agricultural human resource	198	15%
	Pest infestation	198	15%
	Wild animals attack	287	21%
	Others	12	1%
	Total	1355	100%

Production staple crops

Table 12 Increase in production staple crops

	Paddy	Wheat	Maize
Increase production	15%	25%	65%

Production vegetables

Table 13 Increase in vegetable production

		Kilogram	Change
Potatoes	Before	76600	
	After	92900	21%
Cauliflower & cabbage	Before	15647	
	After	19231	23%
Tomotoes	Before	3025	
	After	42992	1321%
Other vegetables	Before	3105	
	After	16375	427%
Round chilies	Before	1110	
	After	2357	112%
Total	Before	99487	
	After	173855	75%

Table 14 Reasons for not shifting to high value crops

	Lack of technical know how	Shortage of agricultural equipments	Unreliable market	Shortage of agriculural labor	Others	
Number of responses	414	232	142	334	33	1155
Percentage of responses	36%	20%	12%	29%	3%	100%

Agricultural extension services

Table 15 Smallholder farmers that received agricultural training from local government or Small Irrigation Programme

Agricultural training from local government or the Small Irrigation Programme		
Yes	49	10%
No	452	90%
Total	501	100%

Operations and maintenance

Table 16 Time and money savings in operations and maintenance

	Before the rehabilitation of the SIS	After the rehabilitation of the SIS	Reduction
Labor input (Days)	9718	2262	77%
Cash input	NPR 217.784	NPR 97.497	55%

Customer satisfaction

Figure 5 Smallholder farmers satisfaction with the Small Irrigation Programme

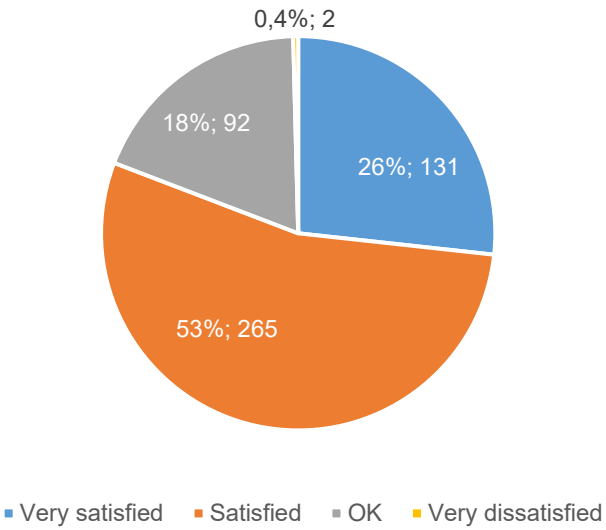
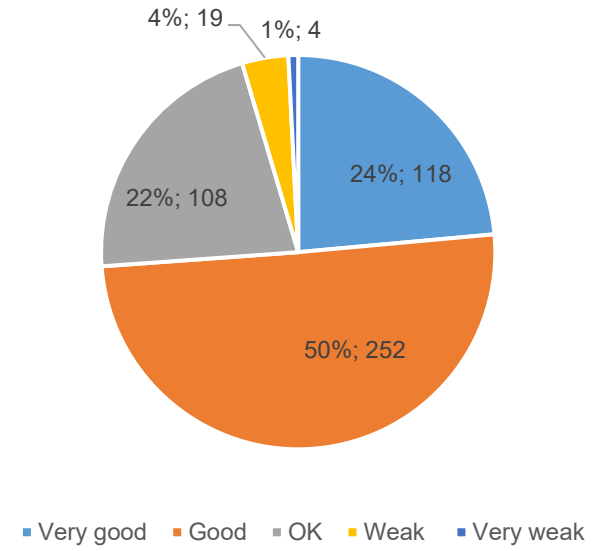


Figure 6 Smallholder farmers satisfaction with the small irrigation schemes



I Benefit-cost analysis

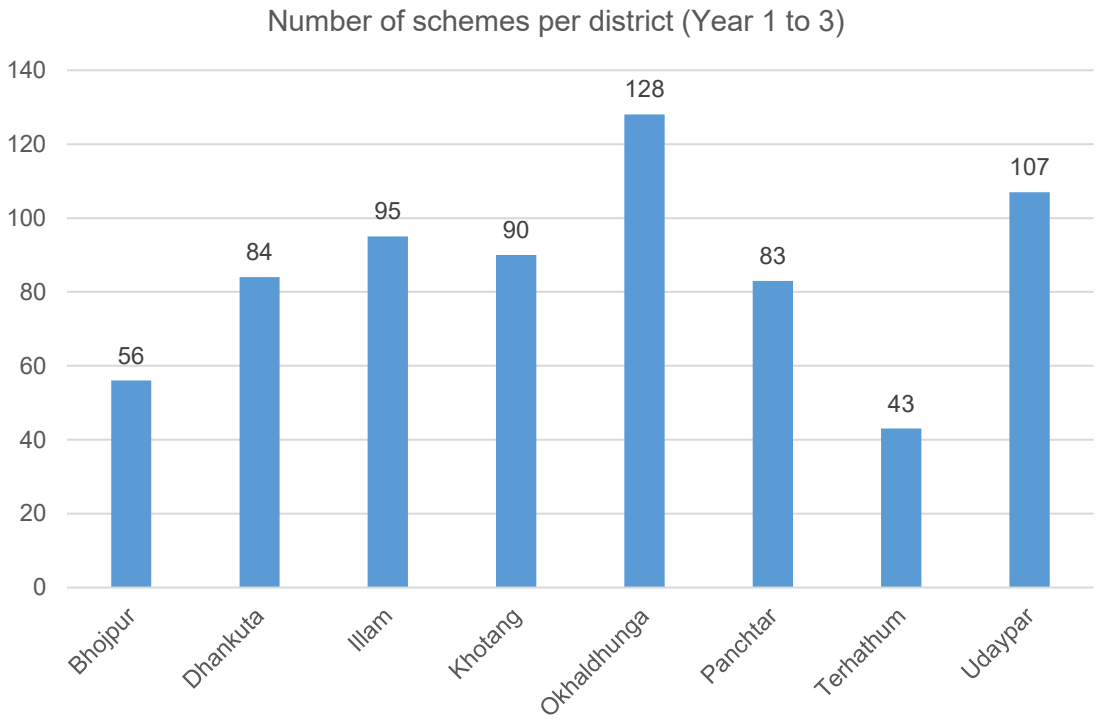
	Benefits						Costs		
Fiscal years	Additional production for home consumption (valued at market prices)	Additional income from market sales	Wage salary earned during construction	Inflation rate	Net depreciation rate	Total benefits	Civil works	Other project costs	Total costs
2020 2021	0	0	CHF 147.531			CHF 147.531	CHF 1.973.218,46	CHF 632.144,59	CHF 2.605.363,05
2021 2022	CHF 183.374	CHF 106.238	CHF 2.451.859			CHF 2.741.471	CHF 8.742.075,83	CHF 977.152,51	CHF 9.719.228,34
2022 2023	CHF 2.168.096	CHF 1.256.098	CHF 2.918.868			CHF 6.343.062	CHF 9.523.712,05	CHF 1.123.468,96	CHF 10.647.181,01
2023 2024	CHF 4.648.724	CHF 2.693.265	CHF 2.163.304			CHF 9.505.292	CHF 11.001.306,55	CHF 1.127.705,10	CHF 12.129.011,65
2024 2025	CHF 7.369.467	CHF 4.269.543				CHF 11.639.010			
2025 2026				6%		CHF 12.337.350			
2026 2027				6%		CHF 13.077.591			
2027 2028				6%		CHF 13.862.247			
2028 2029				6%		CHF 14.693.981			
2029 2030					5%	CHF 13.959.282			
2030 2031					5%	CHF 13.224.583			
2031 2032					5%	CHF 12.489.884			
2032 2033					5%	CHF 11.755.185			
2033 2034					5%	CHF 11.020.486			
2034 2035					5%	CHF 10.285.787			
2035 2036					5%	CHF 9.551.088			
2036 2037					5%	CHF 8.816.389			
2037 2038					5%	CHF 8.081.690			
2038 2039					5%	CHF 7.346.991			
2039 2040					5%	CHF 6.612.292			
2040 2041					5%	CHF 5.877.593			
2041 2042					5%	CHF 5.142.894			
2042 2043					5%	CHF 4.408.194			
2043 2044					5%	CHF 3.673.495			
2044 2045					5%	CHF 2.938.796			
2045 2046					5%	CHF 2.204.097			
2046 2047					5%	CHF 1.469.398			
2047 2048					5%	CHF 734.699			
2048 2049					5%	CHF 0			
			World Bank discount rate 6%		**NPV Benefits**	**CHF 115.756.950**		**NPV Costs**	**CHF 29.654.860**
								Benefit-cost ratio	**3,9**
			ADB discount rate 9%		**NPV Benefits**	**CHF 87.645.612**		**NPV Costs**	**CHF 27.384.796**
								Benefit-cost ratio	**3,2**

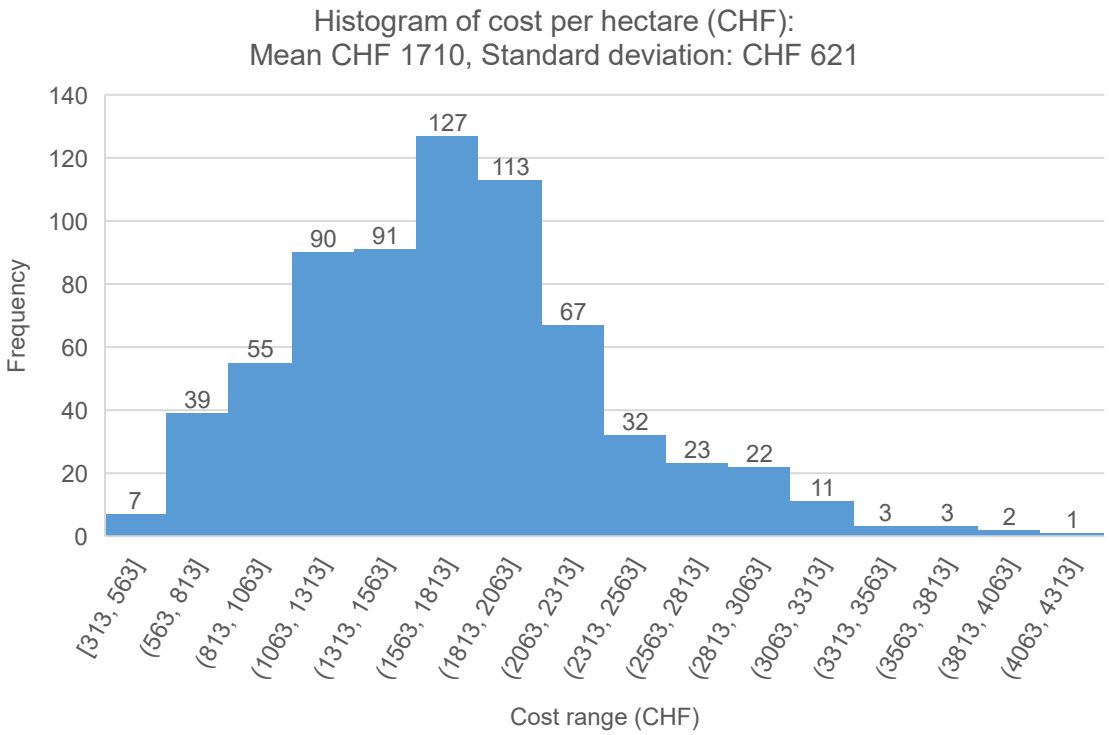
Input and calculations			
Exchange rates			**Source**
2020-2021	0,00774		July exchange rate from end of fiscal year from European Commisison Exchange Rate Converter
2021-2022	0,00756		July exchange rate from end of fiscal year from European Commisison Exchange Rate Converter
2022-2023	0,00683		July exchange rate from end of fiscal year from European Commisison Exchange Rate Converter
2023-2024	0,00672		July exchange rate from end of fiscal year from European Commisison Exchange Rate Converter
Impact indicators			
Total additional production:			
Value of additional production for home consumption 2023-24:	**NPR 23.053**	CHF 155	Field survey (plus see assumptions)
Additional income from market sales per household 2023-24:	**NPR 13.356**	CHF 90	Field survey
Own calculations			**Explanation**
Inflation rate		1,06	25-year CPI average (Source: World Bank Data Bank)
Inflation-adjusted value of additional production for home consumption - Year 2		CHF 138	Inflation-adjusted
Inflation-adjusted value of additional production for home consumption - Year 3		CHF 146	Inflation-adjusted
Inflation-adjusted value of additional production for home consumption - Year 4		CHF 155	equals field survey
Inflation-adjusted value of additional production for home consumption - Year 5		CHF 164	Inflation-adjusted
Inflation-adjusted additional income from market sales per household - Year 2		CHF 80	Inflation-adjusted
Inflation-adjusted additional income from market sales per household - Year 3		CHF 85	Inflation-adjusted
Inflation-adjusted additional income from market sales per household - Year 4		CHF 90	equals field survey
Inflation-adjusted additional income from market sales per household - Year 5		CHF 95	Inflation-adjusted
Inflation-adjusted value of additional production for home consumption - Year 2 (Total)		CHF 183.374	Inflation-adjusted average x number of beneficiaries
Inflation-adjusted value of additional production for home consumption - Year 3 (Total)		CHF 2.168.096	Inflation-adjusted average x number of beneficiaries
Inflation-adjusted value of additional production for home consumption - Year 4 (Total)		CHF 4.648.724	Inflation-adjusted average x number of beneficiaries
Inflation-adjusted value of additional production for home consumption - Year 5 (Total)		CHF 7.369.467	Inflation-adjusted average x number of beneficiaries
Inflation-adjusted additional income from market sales per household - Year 2 (Total)		CHF 106.238	Inflation-adjusted average x number of beneficiaries
Inflation-adjusted additional income from market sales per household - Year 3 (Total)		CHF 1.256.098	Inflation-adjusted average x number of beneficiaries
Inflation-adjusted additional income from market sales per household - Year 4 (Total)		CHF 2.693.265	Inflation-adjusted average x number of beneficiaries
Inflation-adjusted additional income from market sales per household - Year 5 (Total)		CHF 4.269.543	Inflation-adjusted average x number of beneficiaries
Outcome monitoring summary of programme			**Source**
Number of beneficiaries (households) - year 2		1.330	Annual report 2021-22
Number of beneficiaries (households) - year 3		14.835	Annual report 2022-23
Number of beneficiaries (households) - year 4		30.008	Annual report 2022-23
Number of beneficiaries (households) - year 5		44.878	OMS 2023-24
Wage earnings			
2020-2021	NPR 19.060.901	CHF 147.531	Project information data sheet of the programme
2021-2022	NPR 324.319.929	CHF 2.451.859	Project information data sheet of the programme
2022-2023	NPR 427.359.899	CHF 2.918.868	Project information data sheet of the programme
2023-2024	NPR 321.920.174	CHF 2.163.304	Project information data sheet of the programme

Assumptions

1. The value of the home consumption has been calculated based on the increase in cash income, the relative contribution of sales of cereal and vegetables to this increase in cash income, and the percentage of additional production of cereals and vegetables that was used for home consumption instead of sold to the market.
2. An inflation rate is used of 6% (the average of the last 25 years, based on World Bank Data Bank data). For the sake of simplicity, inflation-adjustments are made for the programme period (where relevant) and the first five years after completion of year 4. Thereafter, it is incorporated in the net depreciation rate.
3. Beneficiaries realize production and income gain from the first year after completion of the small irrigation scheme. This gain remains constant over time and is only adjusted for inflation.
4. The production and income gain is taken from the field survey (conducted August 2024)
5. The production and income gain is expected to be (i) constant in the first 5 years after scheme completion, and (ii) reduced by net 5% per annum (gross 11%) thereafter due to subpar maintenance and destruction caused by rubble and landslides. These assumptions put the economic life of the small irrigation scheme at 25 years. Accordingly, the 5% net depreciation is calculated from fiscal year 2028/29 onwards.
6. For calculating the net present value of the benefits and costs a discount rate has been used of 6% (as per World Bank guidelines) and 9% (as per ADB guidelines).

J Portfolio analysis (Year 1 to 3)





Mean	CHF 1.710	NPR 254.484
Standard deviation	CHF 621	NPR 92.434
Minimum	CHF 313	NPR 46.648
Max	CHF 4.137	NPR 615.661

Note: Exchange rate of 5 July 2024

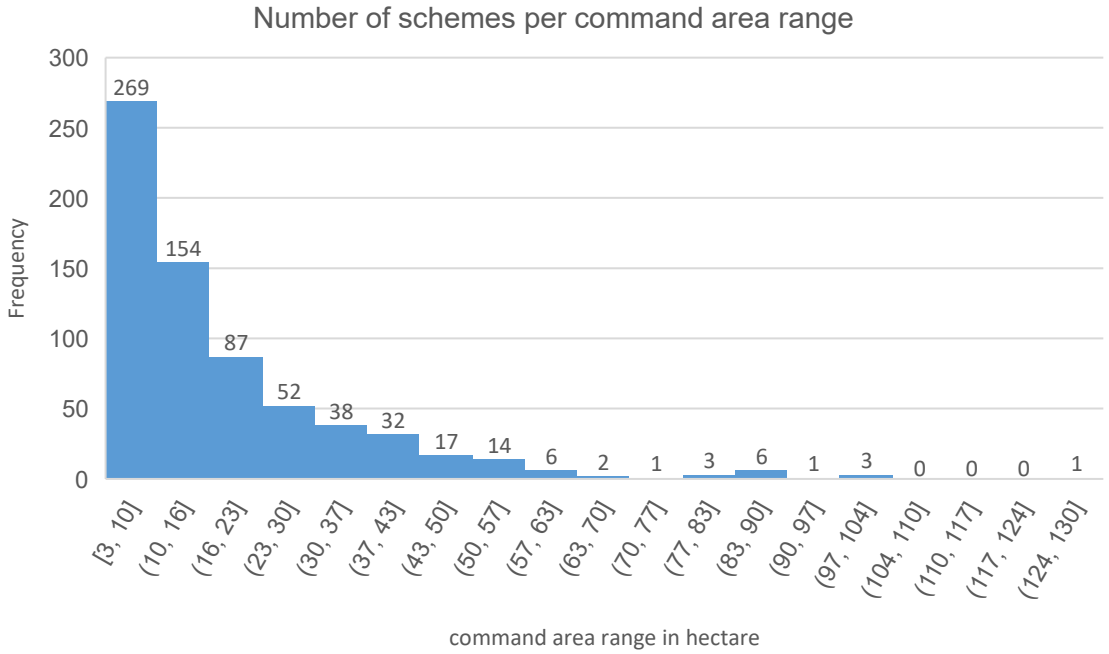
The **cropping intensity** was expected to increase on average from 176% to 228%.

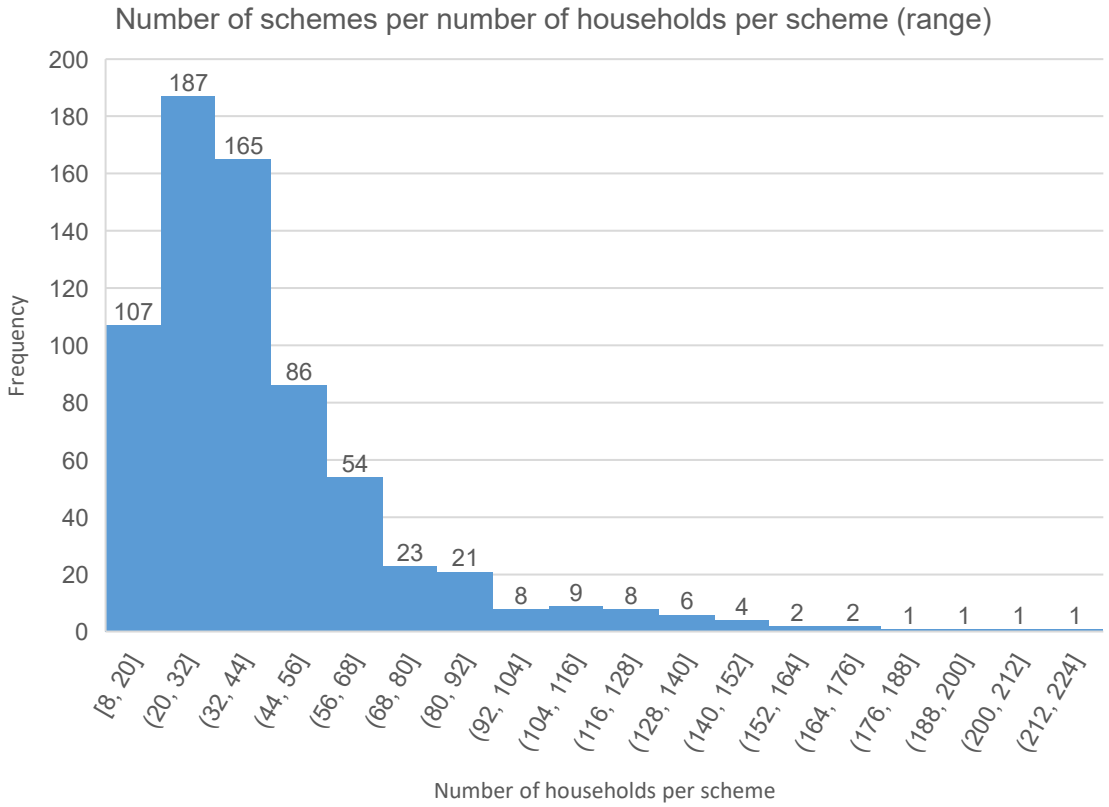
Eleven schemes only did not have **equal representation of beneficiaries from the head, middle and tail-end** of the schemes.

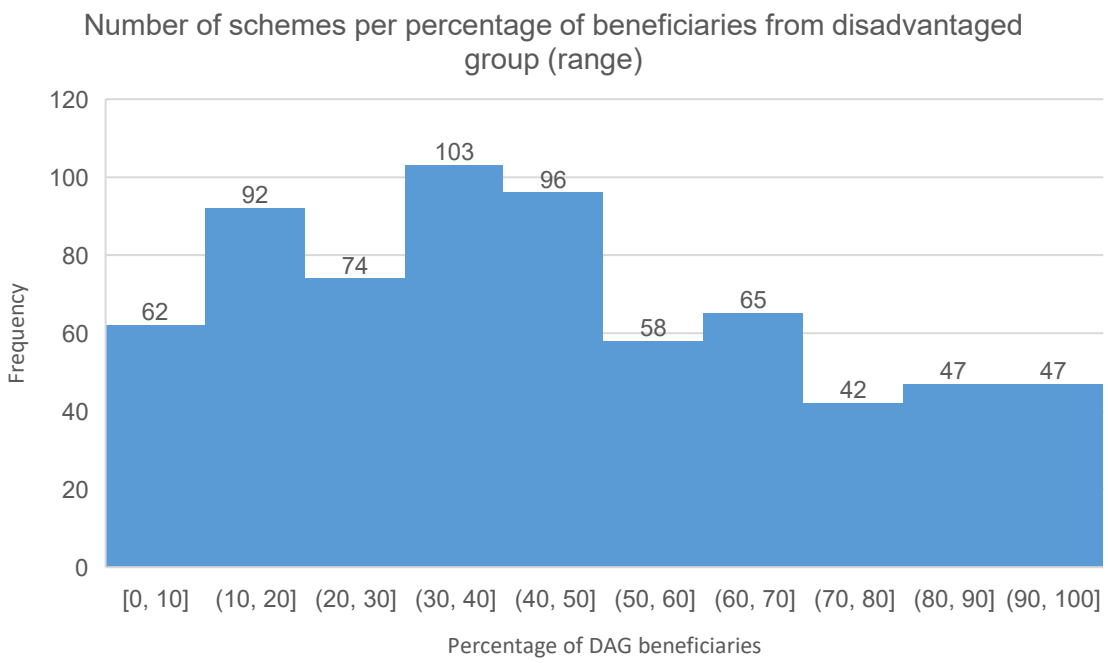
The construction of the 686 irrigation schemes involved **949,196 person days of work** of which 258,386 by women and 722,704 by DAG. This resulted in **CHF 5,179,378 wage income** earned, of which CHF 1,343,943 by women and CHF 3,984,903 by DAGs. (Exchange rate of 5 July 2024)

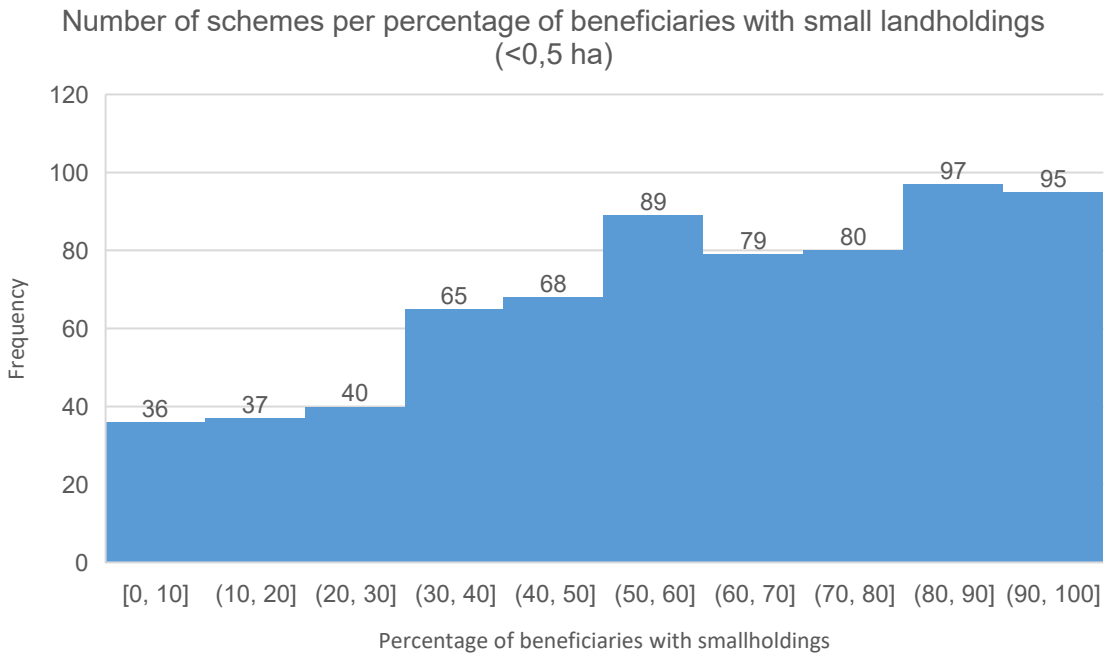
Of the 686 schemes, **50 did not establish an O&M fund,** although only **three schemes failed to deposit upfront cash for the O&M Fund**, **544 failed to have an O&M plan** in place and **581 had no cost estimate on the O&M**.

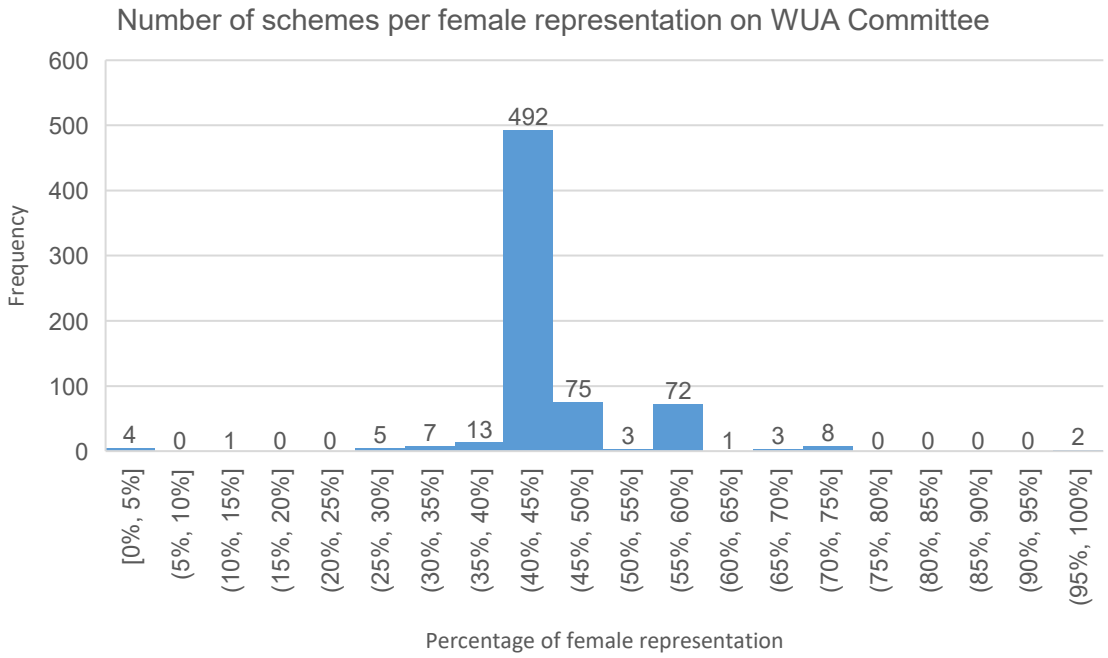
272 schemes received inputs such as seeds, fertilizer, pesticides, mini tractor, and plastic tunnels. **151 from local governments**.

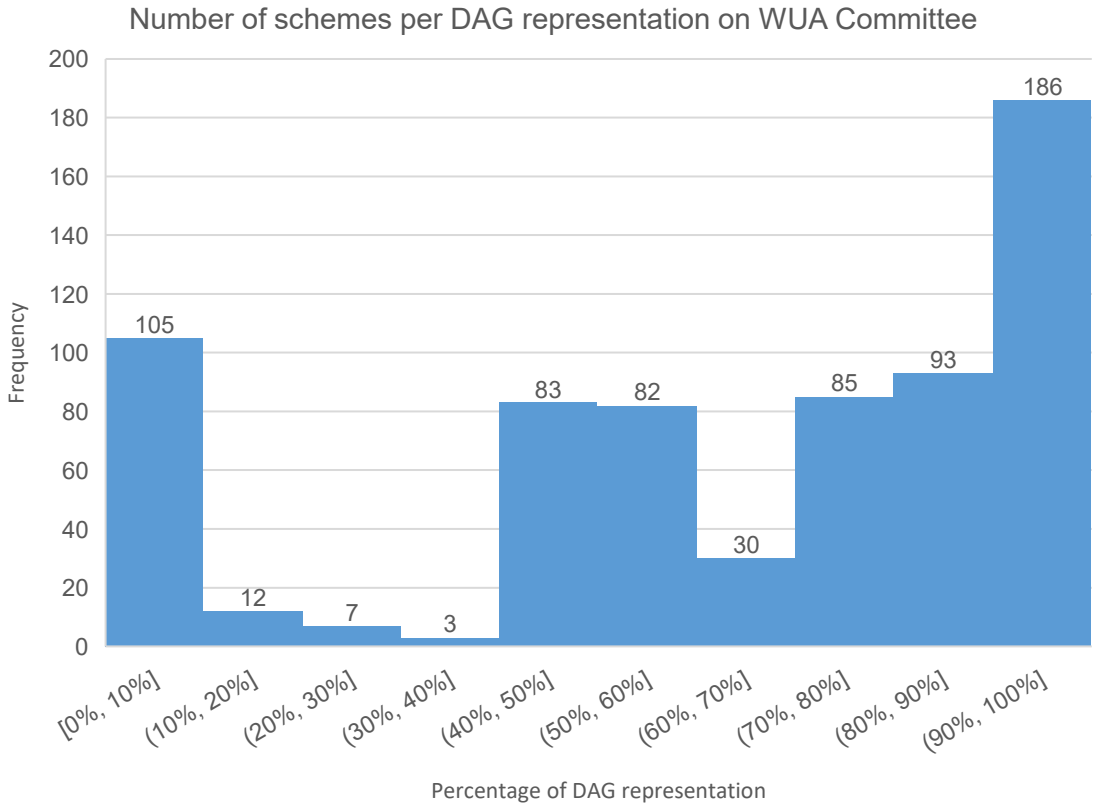





Number of schemes per percentage of beneficiaries from disadvantaged group (range)
Frequency
120
100
80
60
40
20
0
62
92
74
103
96
58
65
42
47
47
[0, 10]
(10, 20]
(20, 30]
(30, 40]
(40, 50]
(50, 60]
(60, 70]
(70, 80]
(80, 90]
(90, 100]
Percentage of DAG beneficiaries


Number of schemes per percentage of beneficiaries with small landholdings (<0,5 ha)
Frequency
120
100
80
60
40
20
0
36
37
40
65
68
89
79
80
97
95
[0, 10]
(10, 20]
(20, 30]
(30, 40]
(40, 50]
(50, 60]
(60, 70]
(70, 80]
(80, 90]
(90, 100]
Percentage of beneficiaries with smallholdings


Number of schemes per female representation on WUA Committee
Frequency
600
500
400
300
200
100
0
4
0
1
0
0
5
7
13
492
75
3
72
1
3
8
0
0
0
0
2
[0%, 5%]
(5%, 10%]
(10%, 15%]
(15%, 20%]
(20%, 25%]
(25%, 30%]
(30%, 35%]
(35%, 40%]
(40%, 45%]
(45%, 50%]
(50%, 55%]
(55%, 60%]
(60%, 65%]
(65%, 70%]
(70%, 75%]
(75%, 80%]
(80%, 85%]
(85%, 90%]
(90%, 95%]
(95%, 100%]
Percentage of female representation


Number of schemes per DAG representation on WUA Committee
Frequency
200
180
160
140
120
100
80
60
40
20
0
105
12
7
3
83
82
30
85
93
186
[0%, 10%]
(10%, 20%]
(20%, 30%]
(30%, 40%]
(40%, 50%]
(50%, 60%]
(60%, 70%]
(70%, 80%]
(80%, 90%]
(90%, 100%]
Percentage of DAG representation

K Documentation

SDC

- International Cooperation Strategy 2021-24
- Swiss Cooperation Programme Nepal 2023-26
- SDC Policy Democratization, Decentralization and Local Governance
- Monitoring system for development relevant changes

Small Irrigation Programme

- Terms of reference review
- Programme document
- No-cost extension
- Results framework
- Outcome monitoring summary
- Programme advisory committee meeting minutes
- Programme coordination committee meeting minutes
- Annual progress reports
- Small irrigation guideline
- Self-evaluation 2023
- Project information
- Baseline study
- Crop cut survey
- Expenditure data
- Social data verification study
- Short-term monitoring survey
- Design verification and CEDRIG Analysis Study
- Memorandum of understanding NAMDP and SIP
- Summary of progress under the NAMDP & SIP collaboration
- Agreement between the Government of Switzerland and the Government of Nepal
- Glossary of outcome and output indicators

Government of Nepal

- Nepal's Constitution of 2015
- 15th National Plan
- Unbundling report

Koshi province

- Koshi Province First Periodic Plan (2079/80-2083/84)
- Irrigation Master Plan 2019

Other

- ADB. Guidelines for the Economic Analysis of Projects (2017)
- ADB. Community Irrigation Project. Project Completion Report (2020)
- ADB. Community-Managed Irrigated Agriculture Sector Project. Financial report (2024)
- Adhikari, B., & Upadhyay, P. Nepal's new Federal Civil Service Bill. (2024)
- Democracy Resource Center. Nepal's Federal Civil Service Bill: An Opportunity to Advance Administrative Federalism (2024)
- The Kathmandu Post. Nine years after adopting the federal constitution, federal civil service law remains elusive (2024)
- USAID. Knowledge-based integrated sustainable agriculture. Factsheet (2017)
- World Bank. Discounting Costs and Benefits in Economic Analysis of World Bank Projects (2016)

L Key informants

Organization/division	Name	Function
SDC Nepal		
	Mr. Matthias Meier	Head of Cooperation
	Mr. Aman Jonchhe	Programme management specialist
	Ms. Jun Hada	Senior programme officer
Programme consultant		
	Mrs. Arya Sarad Gautam	Team Leader
	Mr. Prakash Bahadur Karki	Senior Irrigation Engineer
	Mr. Satya Man Lama	Planning Monitoring and Social Safeguard Specialist
	Mr. Keshab Lama	Social Safeguard Officer / Cluster Coordinator, Fikkal
	Mr. Prem Limbu	Social Safeguard Officer / Cluster Coordinator, Dhankuta
	Mr. Suresh Chaudhary	Social Safeguard Officer / Cluster Coordinator, Udaipur
	Mr. Bhim Bahadur Khatri	NAMDP Manager – Market Services
	Mr. Narayan BK	NAMDP Officer – Market Services
Government of Nepal		
Department of Local Infrastructure (DoLI)	Mr. Ishwor Chandra Marahatta	Director General (DG)
	Mr. Mahesh Chandra Neupane	Deputy Director General (DDG)
	Ms. Maheshwori Khadka	Senior Divisional Engineer (SDE)
Department of Water Resources and Irrigation (DWRI)	Mr. Krishna Raj Pathak	Deputy Director General (DDG)
	Mr. Mohan Shakya	Deputy Director General (DDG)
Government of Koshi Province		
Ministry of Water Supply, Irrigation and Energy	Mr. Ek Raj Karki	Minister
	Mr. Pradeep Bantawa	Secretary
	Mr. Krishna Prasad Rajbansi	Division Chief, WRIDD, MoWSIE
	Mr. Rajendra Kumar Majhi	Engineer
Development partners		
ADB	Mr. Deepak Bahadur Singh	Environment Specialist, Nepal Resident Mission
Independent expert		
	Mr. Harish Chandra Devkota	Agriculture projects
	Mr. Prachanda Pradhan	Institutional Specialist (Farmer Managed Irrigation System Promotion Trust)
Illam District		
Suryodaya Municipality		
	Mr. Ran Bahadir Rai	Mayor
	Mr. Durga Kumar Baral	Deputy Mayor
	Mr. Dolendra Bhardwaj	Chairperson - Ward No.12
	Ms. Lata Gautam Adhikari	Executive Member
	Mr. Milan Bhattarai	Chief Administrative Officer
	Mr. Prabesh Rimal	Agriculture Development Officer
	Mr. Deepesh Aacharya	Engineer, SIP focal person
Ramekhola Water User Association		
	Mr. Dal Bahadur Rai	Chairperson
	Mr. Dhiren Kattel	Secretary
	Ms. Kalika Rai	WUA Member
	Ms. Shyam Kumari Rai	WUA Member
	Mr. Kul Bahadur Rai	WUA Member
	Mr. Arun Rai	WUA Member
	Mr. Chitra Bahadur Rai	Beneficiary
	Mr. Khadga Bahadur Rai	Beneficiary
	Mr. Raj Kumar Rai	Beneficiary

Organization/division	Name	Function
Malbase Water User Association		
	Mr. Kishwor Ramtel	Chairperson
	Ms. Man Kumari Samal	Secretary
	Ms. Dipa Magrati	Treasurer
	Mr. Dilip Rai	WUA Member
	Ms. Amar Kumari Ramtel	Beneficiary
	Mr. Bhim Kumar Rai	Beneficiary
	Mr. Santa Lal Ramtel	Beneficiary
	Mr. Krita Bahadur Magar	Beneficiary
Panchthar District		
Yangwarak Rural Municipality		
	Mr. Bhim Bahadur Younga (Subash)	Chairperson
	Ms. Baba Menyangbo	Vice Chairperson
	Ms. Bimal Rai	Chairperson – Ward no. 3
	Mr. Surya Prasad Gautam	Acting Chief Administrative Officer
	Mr. Ramesh Nepali	Administrative Chief
	Mr. Mobir Pun	Assistant Engineer – SIP focal person
	Mr. Suresh Kumar Begha Limbu	Assistant Engineer
	Ms. Susma Banjara	Agriculture Extension Officer
	Ms. Punam Timilsina	Agriculture Officer
	Mr. Yubraj Mabo	Agriculture Technician
Siwakhola Water User Association		
	Mr. Chhabilal Pokhrel	Chairperson
	Mr. Dhan Bahadur Mabo	Secretary
	Ms. Matimaya Yonghang	Treasurer
	Ms. Manamaya Poudel	Beneficiary
	Ms. Chandra Kumari Mabo	Beneficiary
	Mr. Bharat Singh Mabo	Beneficiary
	Mr. Jit Bahadur Mabo	O & M worker
NAMDP supported trader		
	Mr. Birendra Kafle	Proprietor and Collector, New Bibek Krishi Bhandar, Yangwarak
Dhankuta District		
Chhathar Jorpati Rural Municipality		
	Mr. Chhatra Bahadur Subba	Chairperson
	Ms. Gita Gurung Khewa	Vice Chairperson
	Mr. Dig Bahadur Limbu	Chairperson – Ward No. 5
	Mr. Prabin Hang Yonghang	Chief Administrative Officer
	Mr. Dhakal Singh Limbu	
	Mr. Bimal Lal Shrestha	Chief of Program Department
	Mr. Milan Karki	Agriculture Officer
	Mr. Bhaskar Simkhada	Engineer, SIP focal person
Mahalaxmi Municipality		
	Mr. Dhrubaraj Raya	Mayor
	Ms. Manju Kumari Karki	Deputy Mayor
	Mr. Padam Raj Rakhal	Chairperson – Ward No. 2
	Mr. Shiva Raj Bk	Chairperson – Ward No. 6
	Mr. Netra Bahadur Adhikari	Chairperson – Ward No. 7
	Mr. Prem Bahadur Shah	Chief of Health Department
	Ms. Dil Kumari Rai	Agriculture Officer
	Mr. Nabin Kumar Baboyori	Engineer, SIP Focal person
Leguwabeltar Water User Association, Mahalaxmi		
	Mr. Kedar Karki	Chairperson
	Mr. Dal Bahadur Karki	Secretary
	Ms. Sanjukala Gautam	Treasurer
	Mr. Bharat Thapa	WUA Member
	Ms. Roshani Shrestha	WUA Member
	Ms. Manisha BK	WUA Member
	Mr. Badri Narayan Chapagain	WUA Member

Organization/division	Name	Function
Puchhar Kulo water user association, Chhathar Jorpati Rural Municipality		
	Mr. Bhoj Bahadur Limbu	Chairperson
	Mr. Raj Bahadur Limbu	Secretary
	Ms. Parbati Mishra Subedi	Treasurer
	Ms. Pramila Limbu	WUA Member
	Ms. Dambar Kumari Limbu	WUA Member
	Mr. Tek Bahadur Limbu	WUA Member
	Mr. Purna Hang Limbu	WUA Member
	Mr. Lok Mani Subedi	Beneficiary
	Ms. Mina Rai	Beneficiary
Chiurebote Water User Association		
	Mr. Shree Prasad Subedi	Chairperson
	Ms. Tulasa Shrestha	Secretary
	Ms. Parbati Tiruwa BK	WUA Member
	Ms. Durga Maya Shrestha	WUA Member
	Ms. Lila Gimi	Beneficiary
	Ms. Santi Tamang	Beneficiary
	Ms. Chhali Maya Tamang	Beneficiary
	Mr. Dambar Bahadur BK	Beneficiary
	Ms. Ganesh Kumari Shrestha	Beneficiary
	Mr. Shreeman Shrestha	Beneficiary
	Mr. Kamal Rai	Beneficiary
NAMDP supported trader		
	Mr. Lekhnath Subedi	Manager – Patlekhola Tarkari Bikri Kendra
	Ms. Sarita Subedi	Proprietor
Udaypur district		
Paua Khola Muhan Gari WUA		
	Mr. Bir Bahadur Rawat	Chairperson
	Ms. Rita Panday	Secretary
	Ms. Bhakta Maya Rawat	WUA Member
	Ms. Kalpana Thapa	Beneficiary
	Mr. Prakash Bhattarai	Beneficiary
	Ms. Man Kumari Katwal	Beneficiary
	Mr. Manoj Kumar Panday	Beneficiary
	Mr. Janak Bahadur Khadka	Beneficiary
	Mr. Netra Bahadur Rawat	Beneficiary
NAMDP supported trader		
	Mr. Ishwor Rana	Proprietor – Namanta Krishi Tatha Pashupanchi Bikash Kendra
	Ms. Meena Shrestha	Officer – Market Services