Mainstreaming Payment for Ecosystem Services in Drinking Water Schemes: Evidences from Koshi Hills, Nepal

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Forest for water: Global Perspectives

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Forest ecosystems are fundamental to maintain water cycle (*FA0, forests and water strategy and action plan)*

SDG 6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes

Growing problems of water scarcity, environmental degradation, food insecurity and poor livelihood conditions and human health all require urgent policy and management measures, pointing attention to interrelationships between forest and water

Forests and Water
– a five-year action plan

Increasing international action to address forest-water interactions in science, policy, economics and forest practices. An action plan of the International Forests and Water Agenda

Local perception

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- "**Sallo** (Pinus roxburghii) forest is drying up our natural water spring"..
  - Elderly man, watershed area
- "**Upstream watershed** is the main source of water of our municipality, … **conserving forests** is key for sustaining water supply"..
  - District development committee rep.
- "There is a **need to provide incentive** to upstream communities for conserving forest"…
  - Indra Rai, Politician

Study Area

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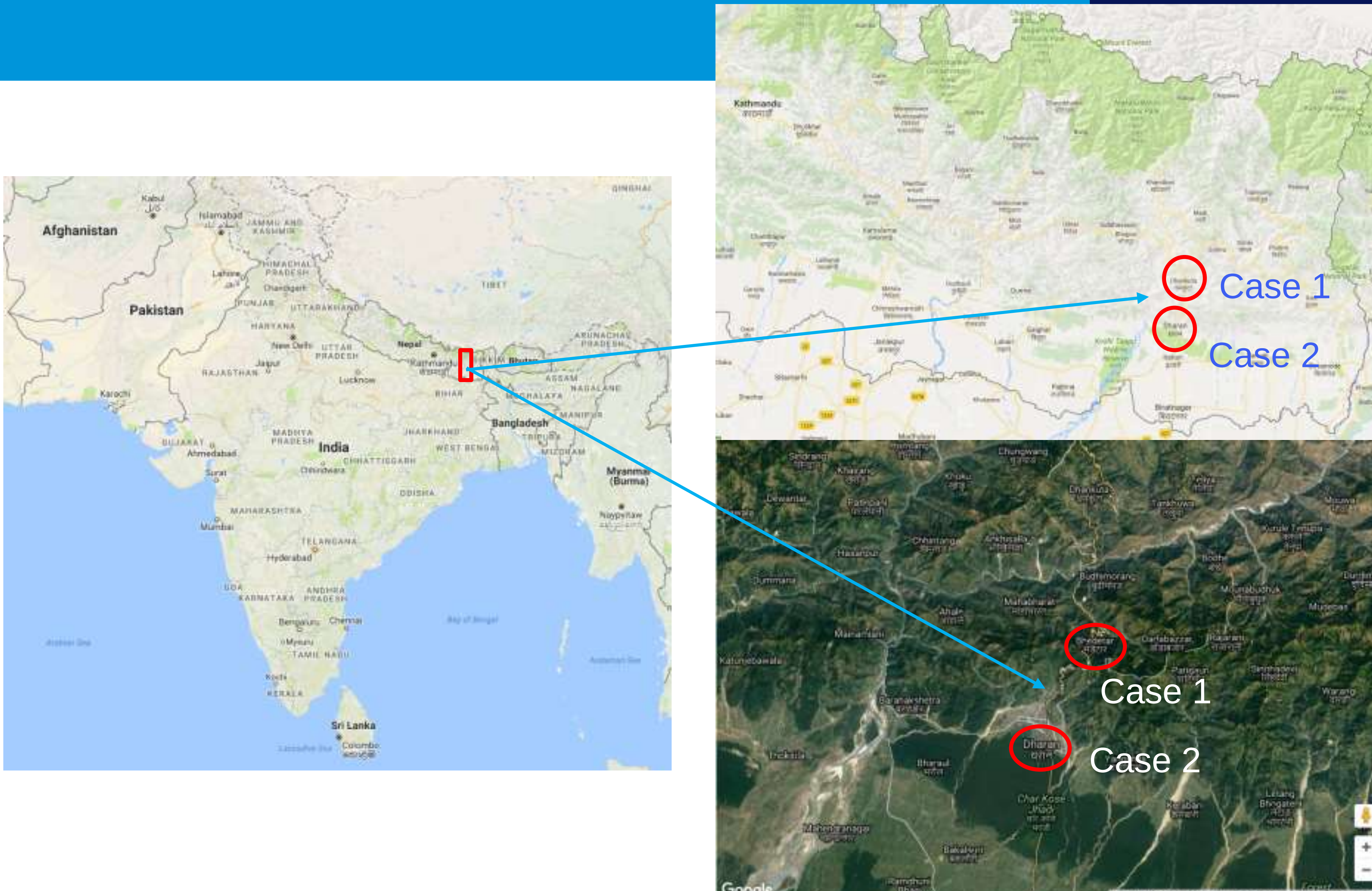

Case 1: Dhankuta municipality

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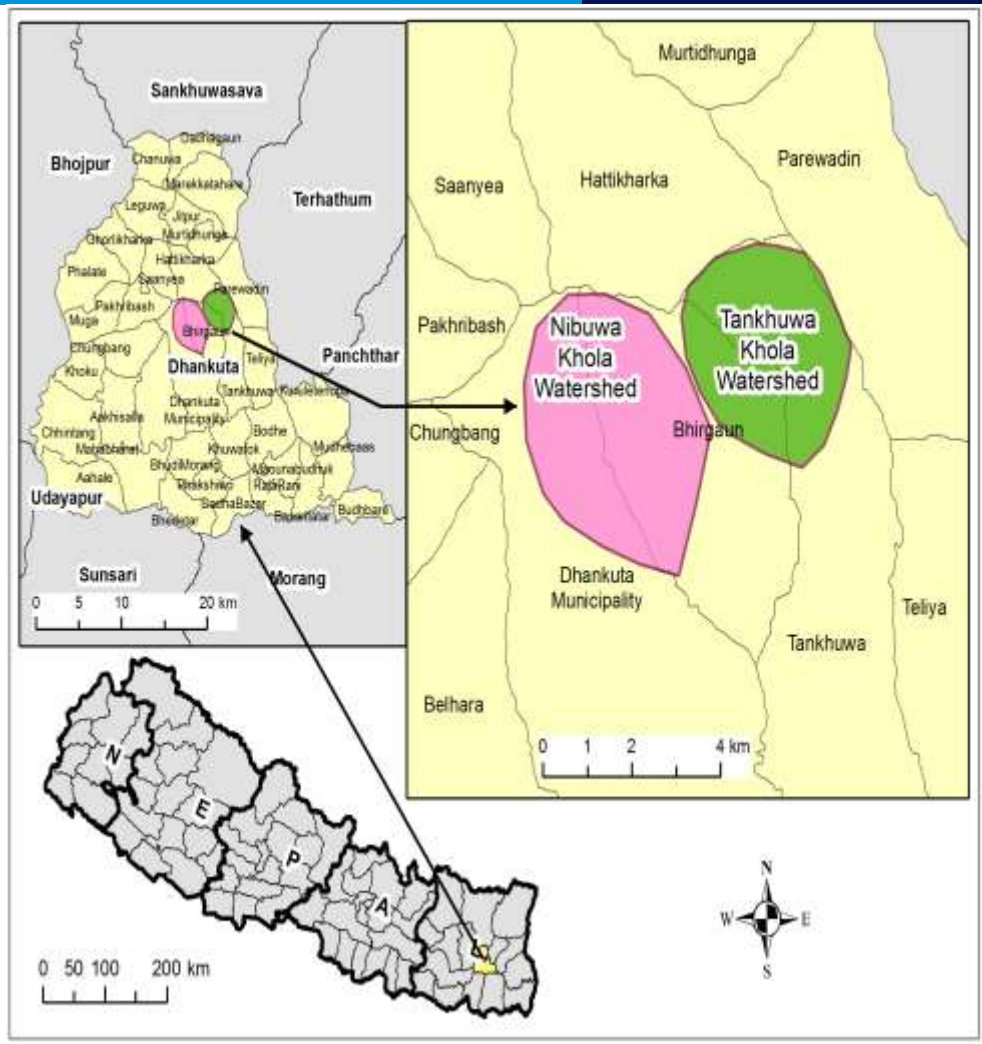
- Population – 27,000
- Rapidly urbanizing
- Water demand
  - 450 Lit/ HH/d
- Water supply – source
  - 80% piped
  - 20% springs
- Water supply - season
  - Monsoon 1hr/d, 5d/week
  - Dry season 1hr/d, 4d/week



Case 1: Dhankuta municipality

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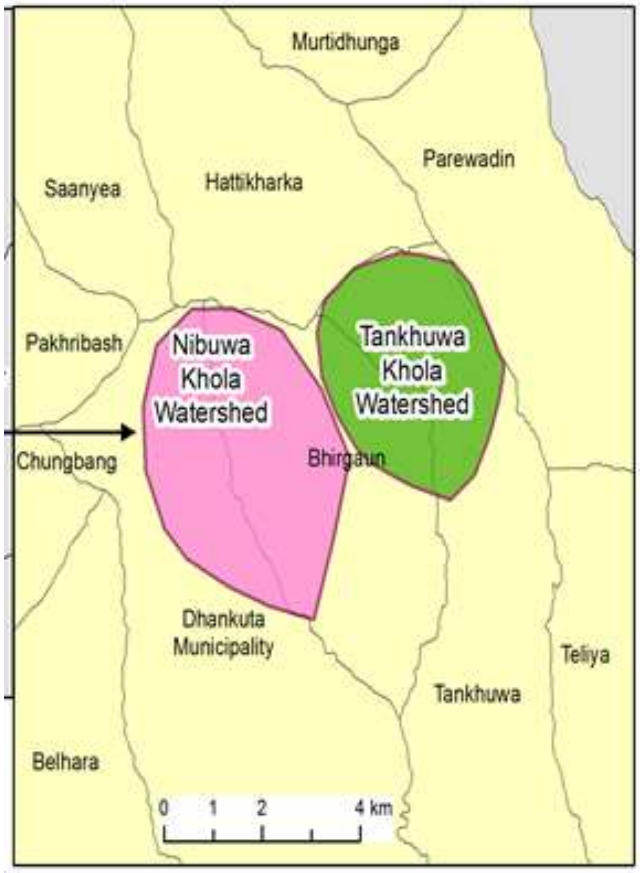
- Siltation of collection tank
  - Deforestation, Agricultural practice
- Seasonal flow decrease
  - 50% in 15 years
- Water quality deterioration
  - Pesticide use, doubled in 5y
- Drying of springs
  - No conservation
  - Unplanned infrastructure



Case 2: Dharan municipality

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- Emerging town in the foothills, 200K population
- Municipal water supply meets
  - 25% during dry season and
  - 60 % during rest of the year
- Water quality is not satisfactory
- Most of the households boil and filter water before consuming
- Municipality is interested to:
  - Improve the supply
  - Encourage upstream community to maintain forest cover

Research questions

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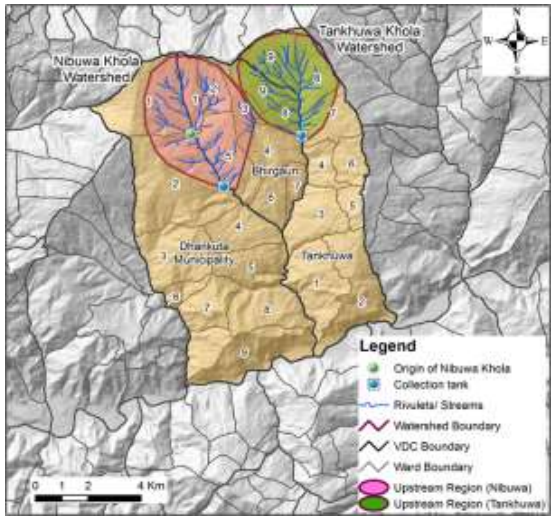
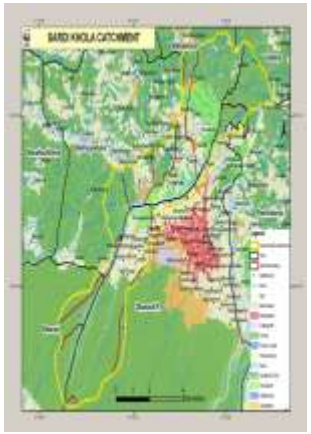
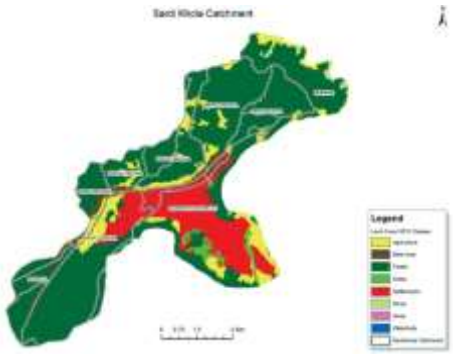
- To estimate WTP for drinking water services among down-stream water consumers
- To explore possibilities of a PES for drinking water services



Dhankuta





Dharan

PES Design

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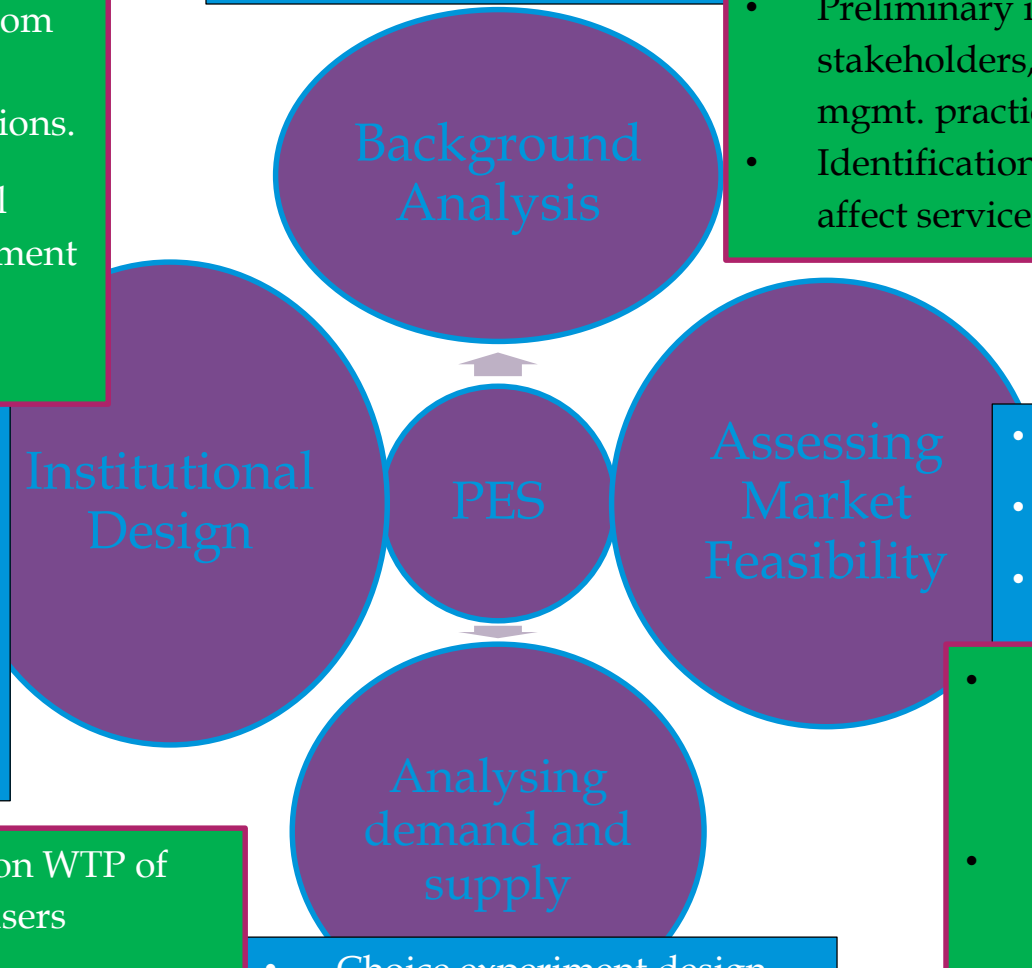
- Literature and document review.
- Expert consultations.

- Preliminary investigation of stakeholders, issues and existing mgmt. practices.
- Identification of factors that affect services.



- Sharing of results from CE survey and stakeholder discussions.
- Design of local level institution to implement PES.

- Discussions with local stakeholders.
- Dialogue with local government and community leaders.

- Mapping of local areas
- FGDs
- Expert consultations.

- List of attributes prioritized by service users.
- Status of current and potential desired watershed activities.

- Estimation WTP of service users
- Interests of upstream communities

- Choice experiment design
- Household survey

Attributes and Choice sets - example

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- Four attributes :
  - Drinking water quantity
  - Drinking water quality
  - Area under landslide
  - Water tariff

Scenario1 Scenario2

Data and model

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- Households survey of users (up & down streams users)
  - Case 1 – Dhankuta: 100 (NKW) +100 (TKW) +150 (downstream)
  - Case 2 - Dharan: 200+200
- Data:
  - respondent-specific characteristics (gender, age, household income/main source, water demand, irrigated/unirrigated lands)
  - Choice set specific data
- Model:
  - Discrete Choice Experiment (DCE)
  - Random-parameter logit model

Case 1: Tankhukhola/ Nibuwa Khola forests - Dhankuta municipality

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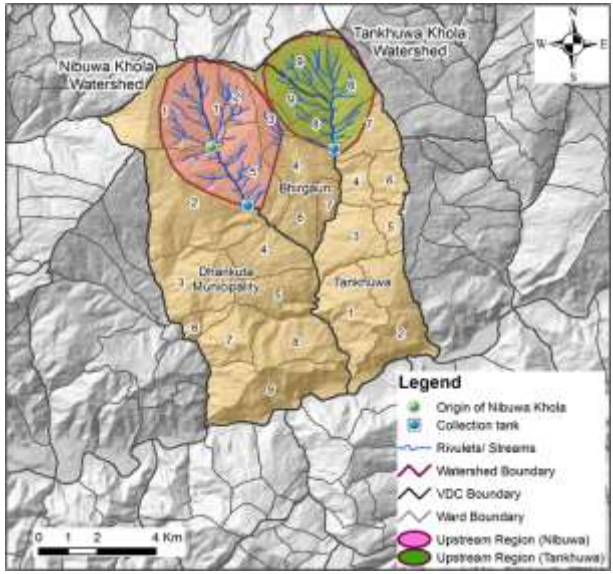
- 80% water supply to Dhankuta town
- Mean household WTP:
  - $62.4/yr, water supplied 24 hours every alternate day
  - $75.6/yr, water supplied 24 hours every day



- A PES mechanism is under operation to protect upstream forests.

Outcome:

- Water users agreed to pay: $1.8/hh/yr per tap to upstream communities.
- Which generates $56.3K/yr

Case 2: Shardikhola watershed: Dharan municipality

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Payment for Scenario 1:

- Double water supply
- Protect 8 hectares from erosion
- Water drinkable out of the tap

WTP (household) – USD 3.58 (↑18%)

Total WTP – USD 118 K

Payment for Scenario 2:

- Improve drinking water quality to make water drinkable after filtering

WTP (household) – USD 2.50 (↑13%)

Total WTP – USD 80 K

Scenario 1 Scenario 2

Institutional arrangement

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Watershed Community

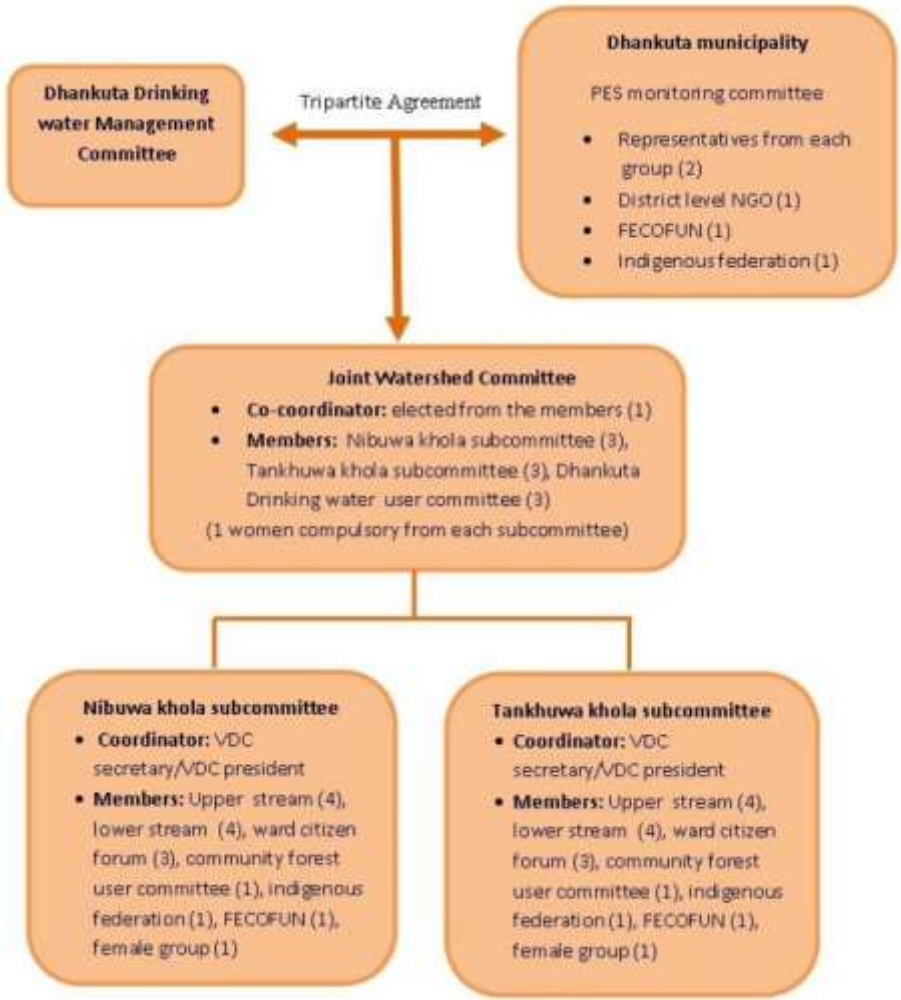
- Household (ES Producers)
- Implement watershed management activities as per the plan,
- Ensure water quantity and quality to municipal users,

Agreement

Monitoring, Program Implementation, Coordination

Water User Committee

- Support financially for watershed management,
- Coordinate with relevant organizations for additional sources if required,



Some Lessons

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- More willingness to pay (WTP)
  - Women headed household
  - Higher household income
  - Larger families
- Upstream communities – weak in negotiation
  - Improved knowledge needed
- Forest-water relationship
  - needs immediate consideration in national development planning

Some Lessons

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- Integrating PES design into project design phase would reduce cost and allow resource managers to participate in the entire process.
- Output based payment may put service providers in risk because the relationship between land-use practices and production of ecosystem services is not clear.
- PES should be considered as a supplementary scheme of the existing resource management approaches. Therefore, designing PES scheme under the multi-sectoral approach would increase the welfare of both service providers and water users.

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