



CE SAIN
Transforming Agri-Food Systems

International Workshop On Land Cover/Land Use Changes (LCLUC), Forestry, and Agriculture in South/Southeast Asia

Impact of Agricultural Land Expansion on Land Use Change and Land Degradation in Cambodia

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Forest Landscape Problem

Land degradation through depletion of forest cover and soils

- Deforestation, erosion of soils and biodiversity, pollution from increased chemical inputs to groundwater and waterways occurred – caused by intensive agricultural practices for cash crops.
- With the increased demand for farmland, forest cover decreased through conversion to agricultural land

Implications

- Degraded land is more vulnerable to climate impacts of increased heat, reduced rainfall and drought, topsoil erosion, floods, and landslides.
- Degraded land is less productive, with farmers experiencing decreased yields and leaving smallholder farmers stuck in market constraints



Food System Problems

The Food System Is Under Enormous Pressure

Covid-19

Agrifood system demonstrated global resilience providing food supply and continued production, Nevertheless **some territories had hunger, lack of basic goods and local governments launched strong food security programs** targeted to food autonomy (Singapore, Greenland, EUA...)

Energy Crisis

Energy is usually second largest cost in food production. **The increase of energy costs during the transition to cleaner energy sources will impose a severe price tag within the food system**

Ukrainia Conflict

A major challenge for the food system with long term multi-year impact.

Supply of basic food commodities is at risk in many parts of the occidental world .

Power concentration

Increased presence of large economies into the global food supply chain. Corporations are entering the Technology race and acquiring technology rights.

This will lead to a shift in the ownership of IP in a segment that will transition from primary sector to an industrial fabric.

Global Warming

The food system is **one of the leading factors for GHG emissions** mostly through centralised production, long complex supply chains, use of petrol based fertilisers use and industrial farming.

At the same time is **heavily affected by temperature rising and climate instability.**

Climate Action Taxes

Climate action will result in significant restrictions to be imposed on the global Agifood supply chain. From **increased taxed activities** (farming is happening now) to strong regulation of the various production methods and supply chain.

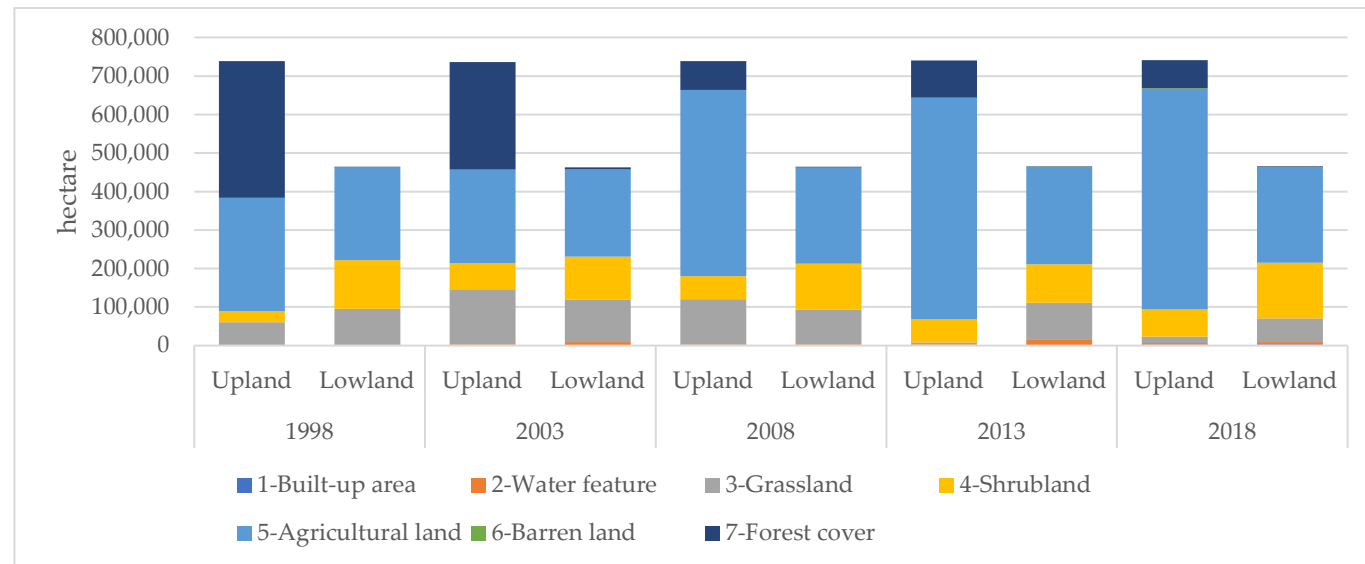
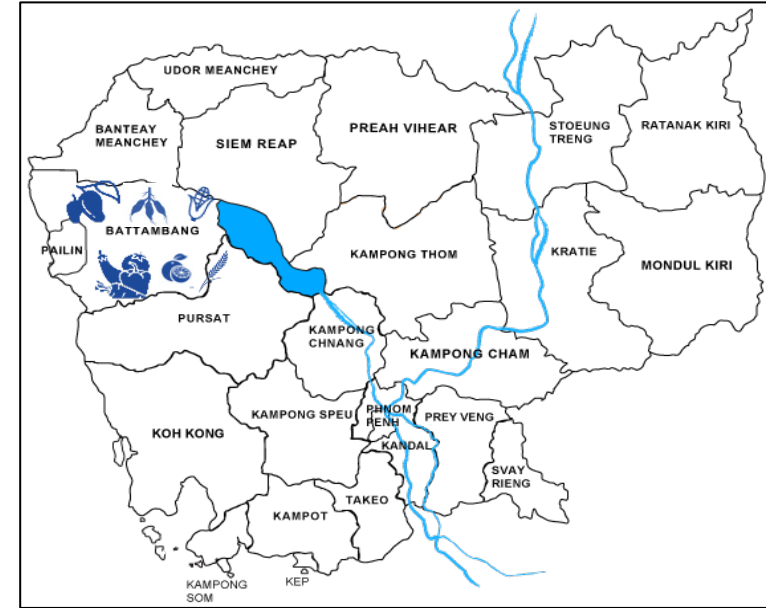


Background of Study

- From 1960 to 2019, land-use change has affected nearly **a third of world land areas (32%)** (Winkler, et. al., 2021)
- Cambodia's agricultural land expanded from **26% to 31%** between 1997 and 2007 (FAO, 2010)
- Around **65%** of the forest cover loss mainly occurred from **2006-2016** (Kong et al, 2019)
- Agricultural expansion leads to further water shortages, **land degradation**, and desertification (Manandhar et al., 2009; Oeurng et al., 2019), while, the North-West of Cambodia is also facing **land degradation** and soil erosion (BELFIELD., et al., 2013).
- A complete picture of LULCC in the whole Battambang Province, from 1998 to 2018 **is not precisely understood** by the researcher.
- Therefore, agricultural solutions must be innovated to enhance the productivity with value added to combat land degradation & forest clearance

Overview of Study Area

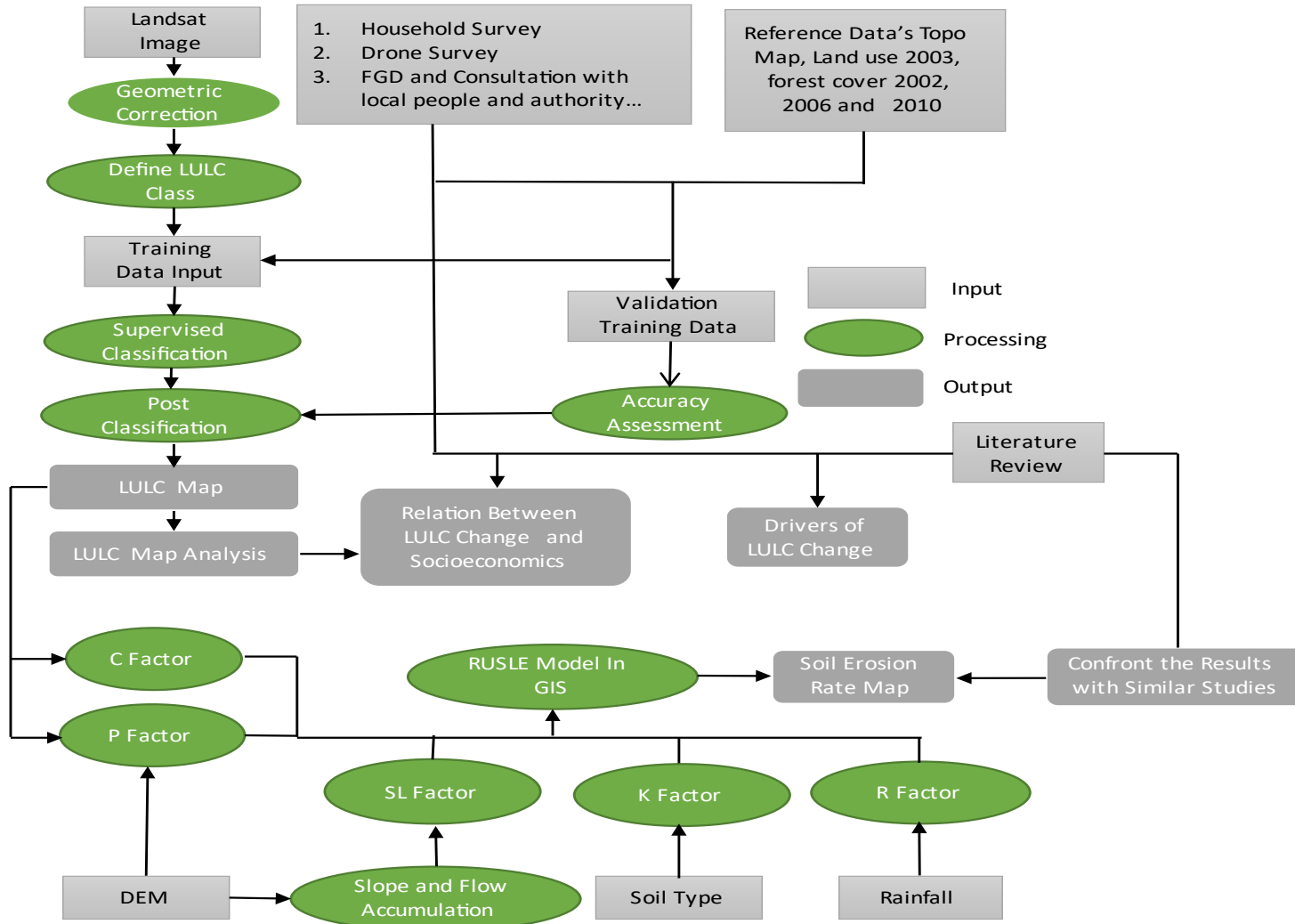
- Battambang is the fifth largest province in Cambodia. This province is located in the Northwest Region of Cambodia, which is a great landscape in social and economic.
- Battambang is classified into four ecological zones: upland area, semi-upland area, lowland area, and floodplain along Tonle Sap Lake, and has a mixture of various land uses.
- The agricultural production of the province has the largest area in the country. By 2019 Battambang has paddy fields covered 699,944 hectares while other crops were grown on 297,312 hectares. Permanent crops such as mango (*Mangifera indica*), longan (*Dimocarpus longan*), and cashew (*Anacardium occidentale*) are primarily planted in the uplands.



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- Battambang **ended the civil war in 1998** by a **win-win policy**
- A complete picture of LULCC in the whole Battambang Province, from 1998 to 2018 **is not precisely understood** by the researcher.

Research Methodology

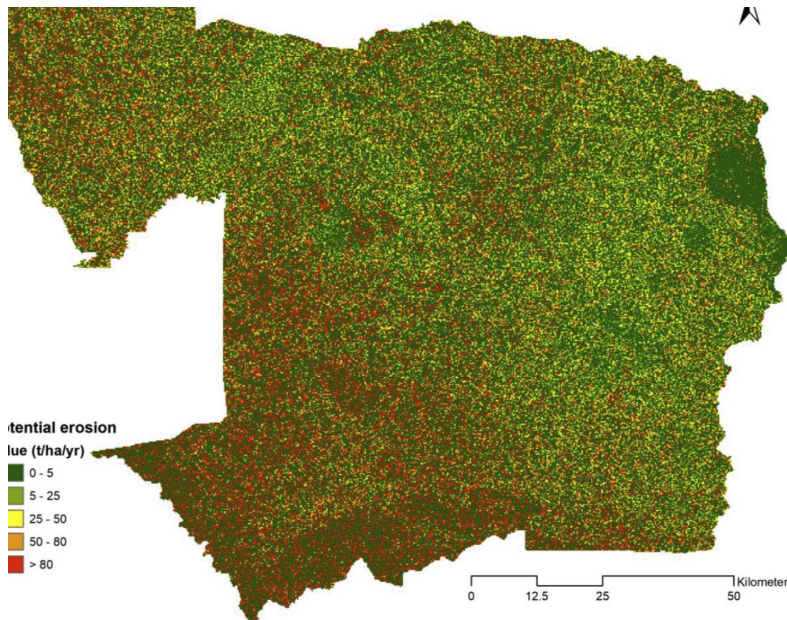


- 1) Reviewed agroecology or conservation agriculture practices in Battambang
- 2) Conducted value chain analysis with potential crops that can be transited to agroecology through consultation, field observation, expert inputs, and interviews with farmers
- 3) Suggest solutions for agroecology market development for targeted districts

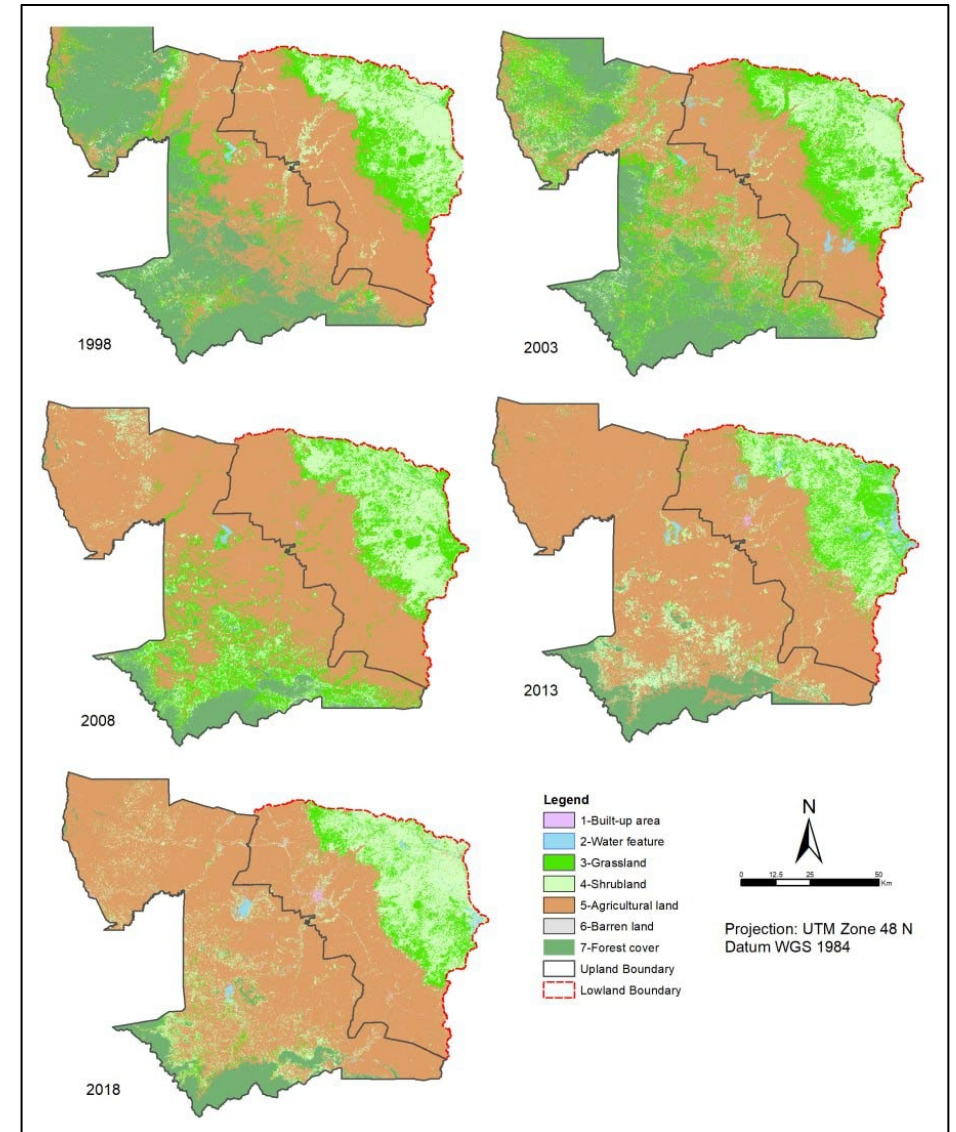
Result: LULC of Battambang

Land degradation through depletion of forest cover and soils

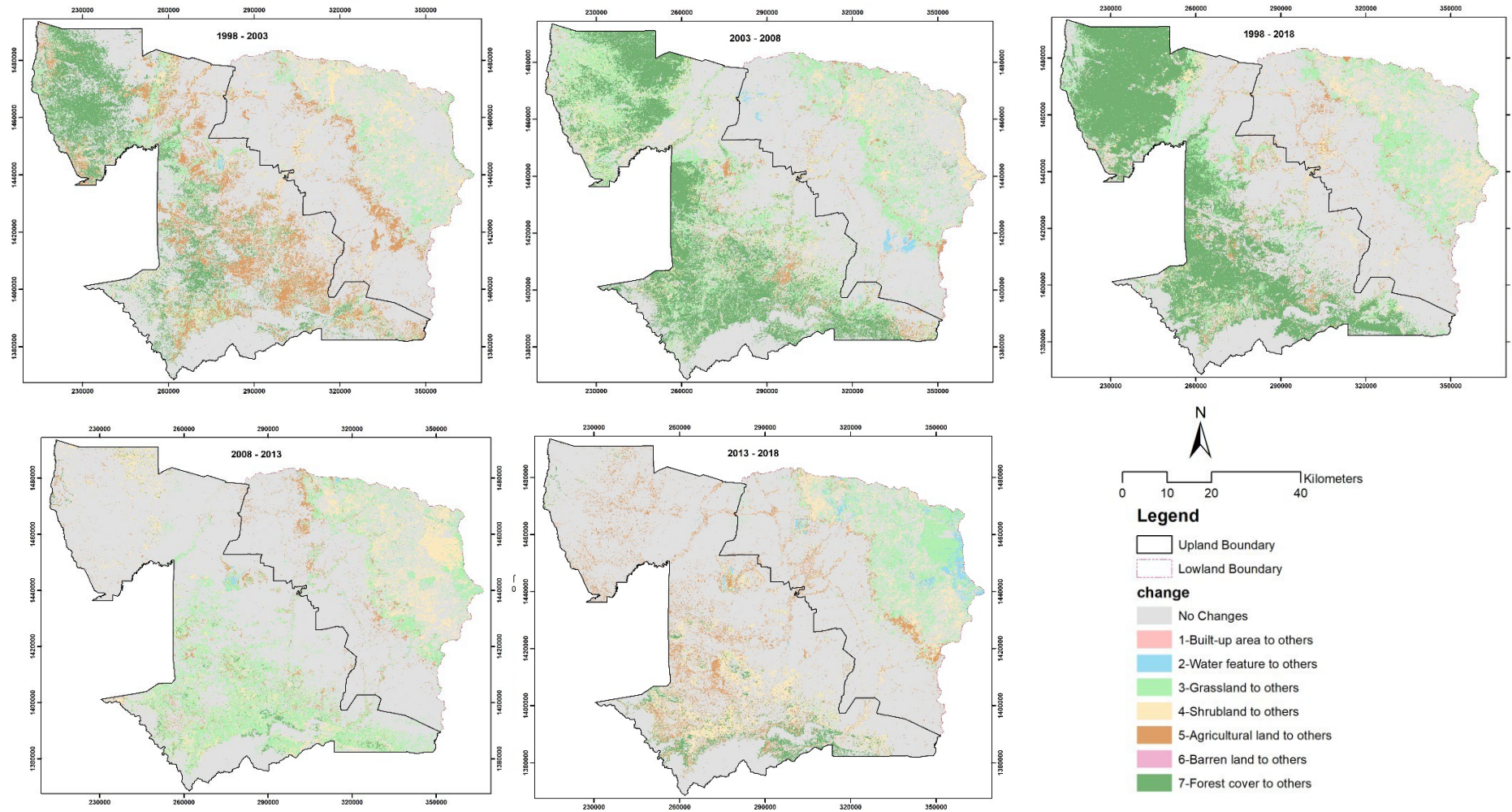
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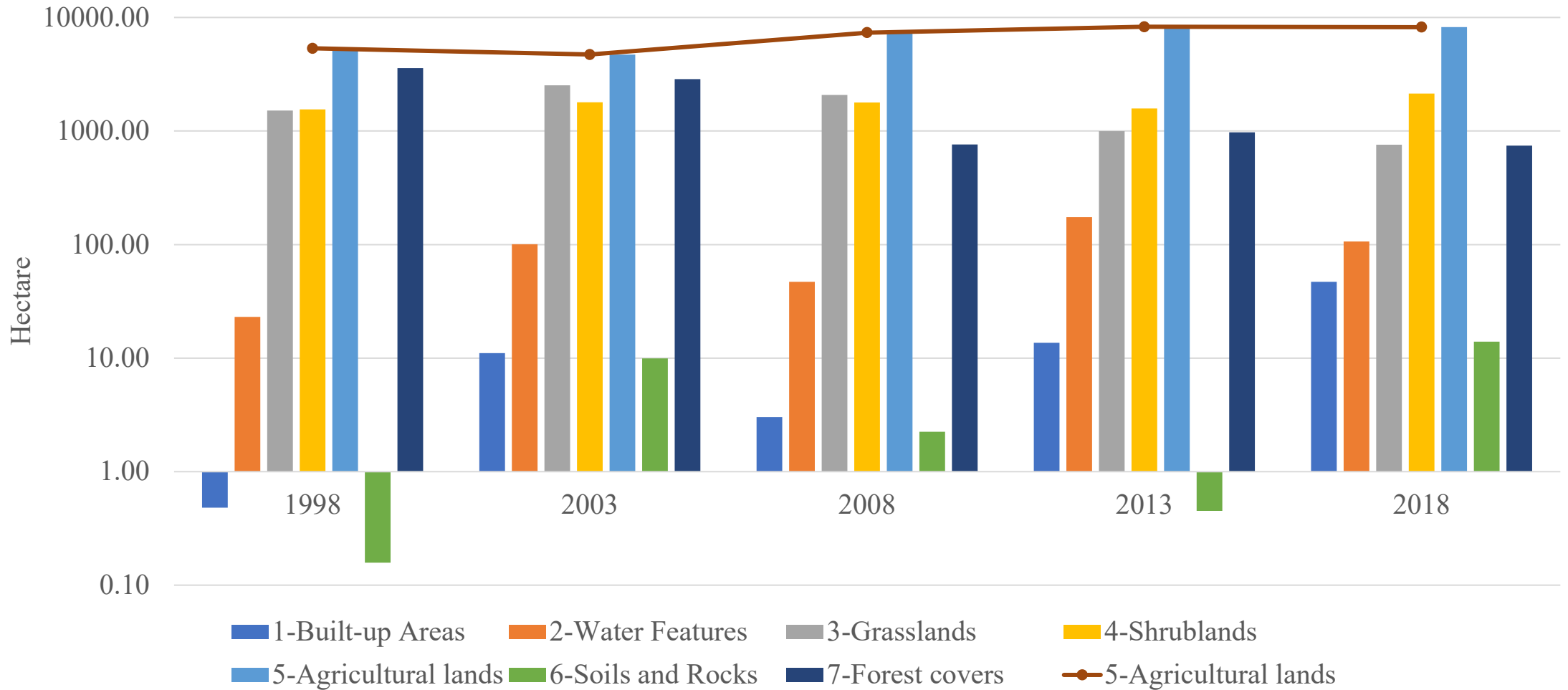
- Forest cover degradation had changed from 29.82% to 6.18% for 1998, and 2018
- Annual soil loss by 2018 was 4267,439 t (71.91 %)



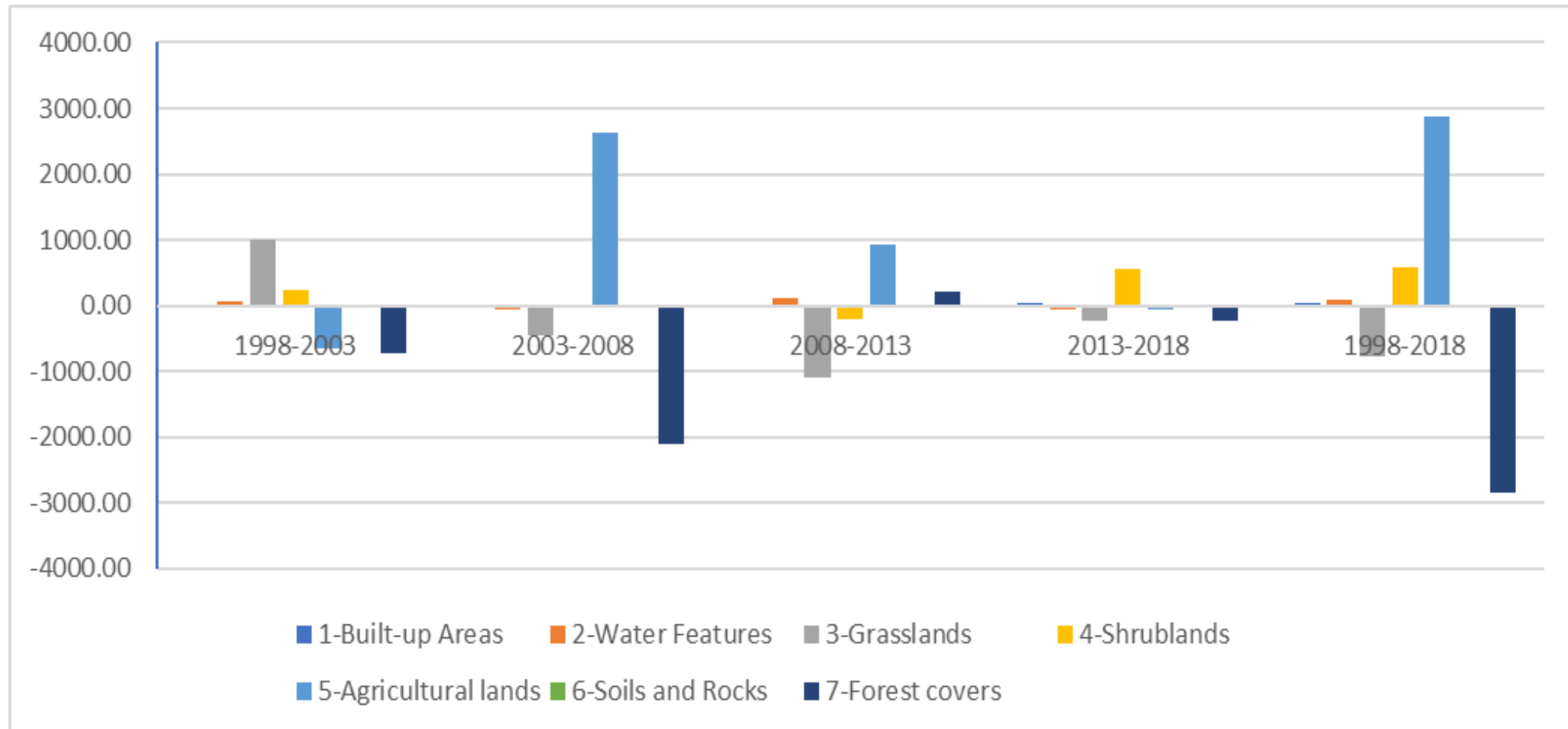
LULC Detection Between 1998-2018



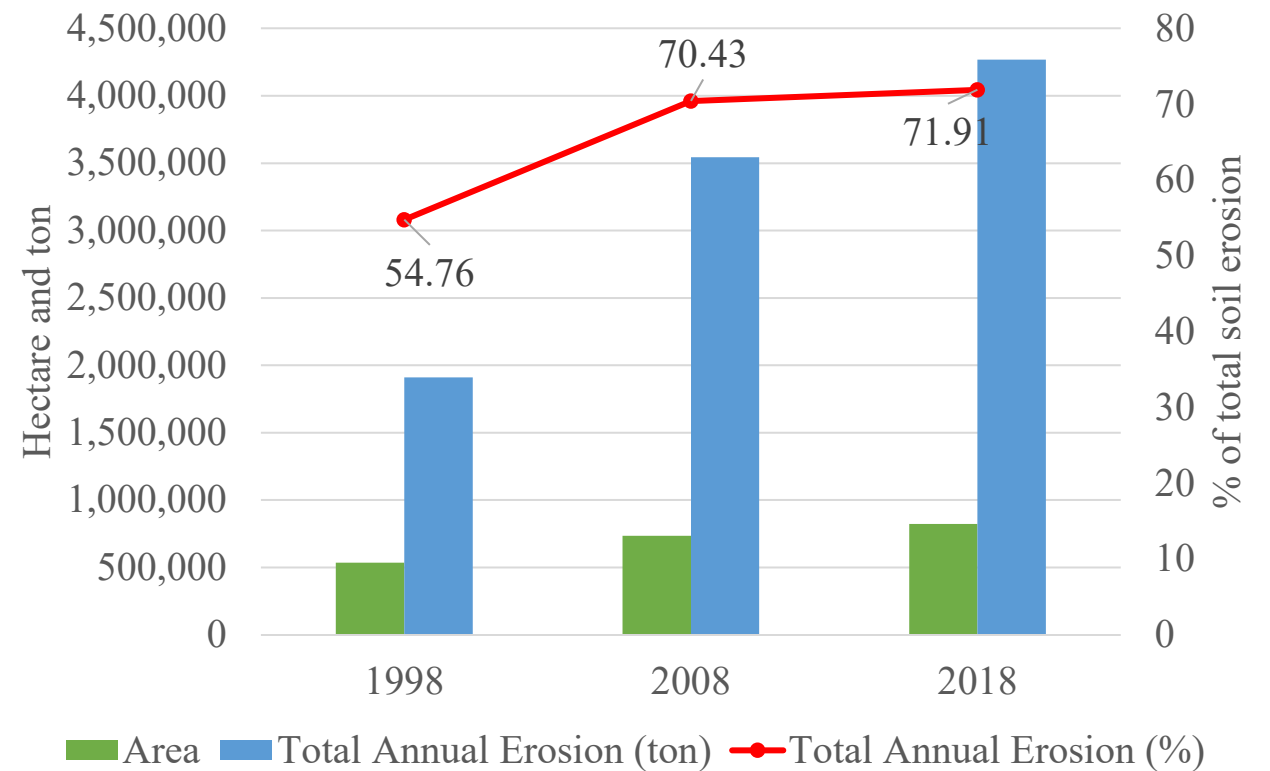
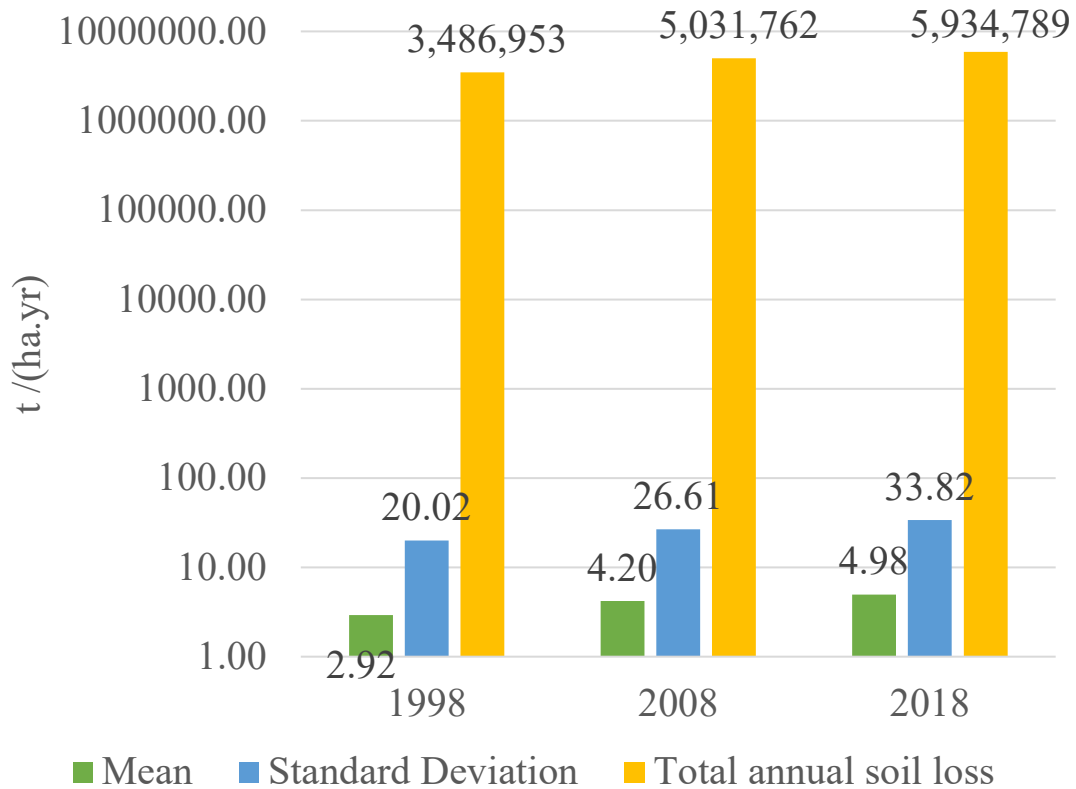
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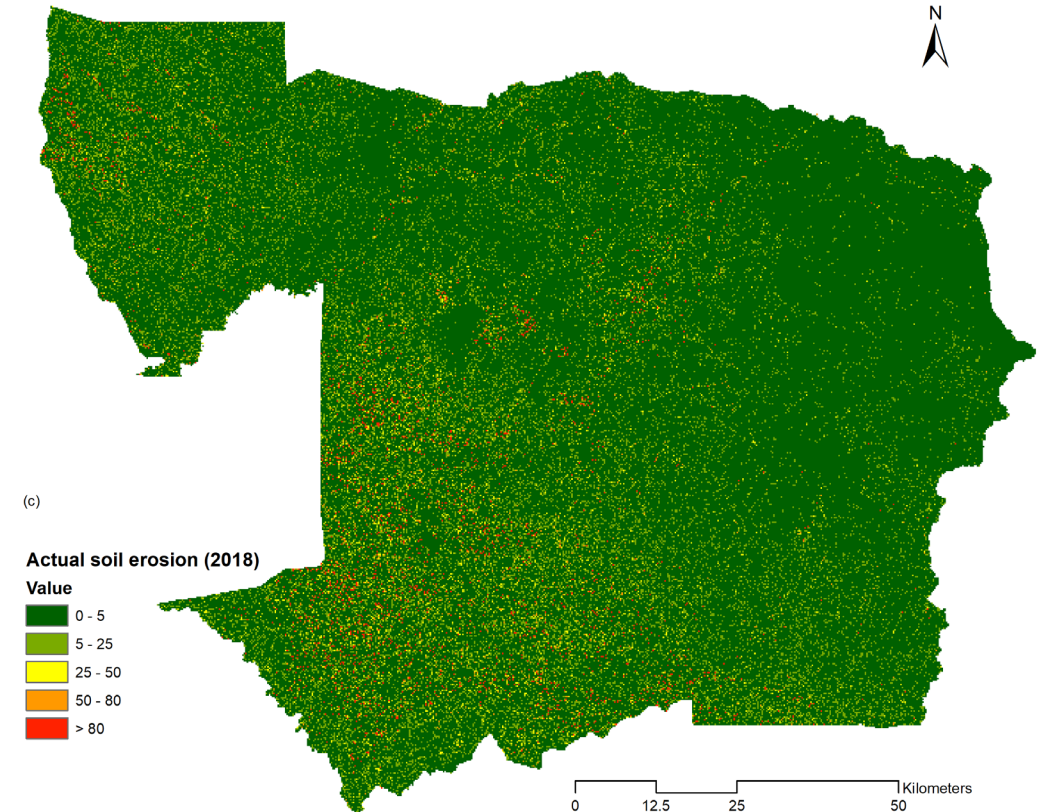
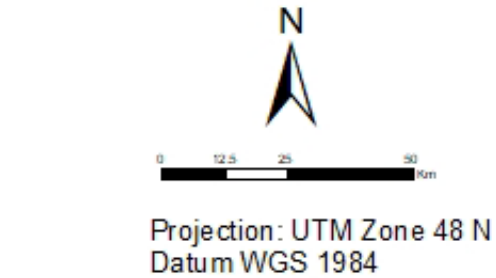
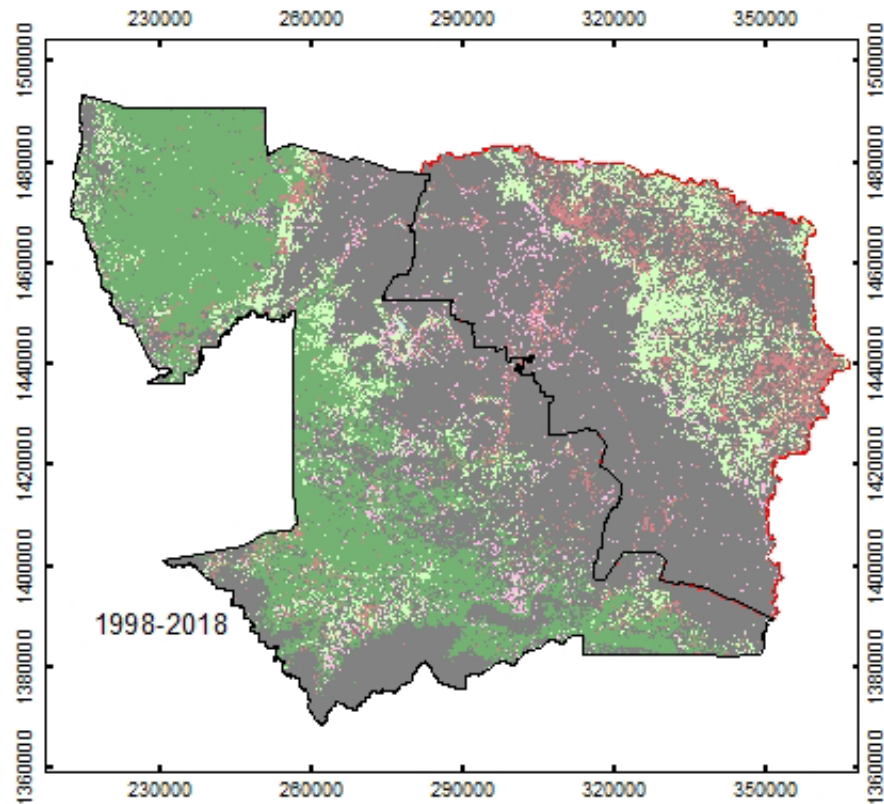
LULCC between: 1998-2003, 2003-2008, 2008-2013 and 2013-2018



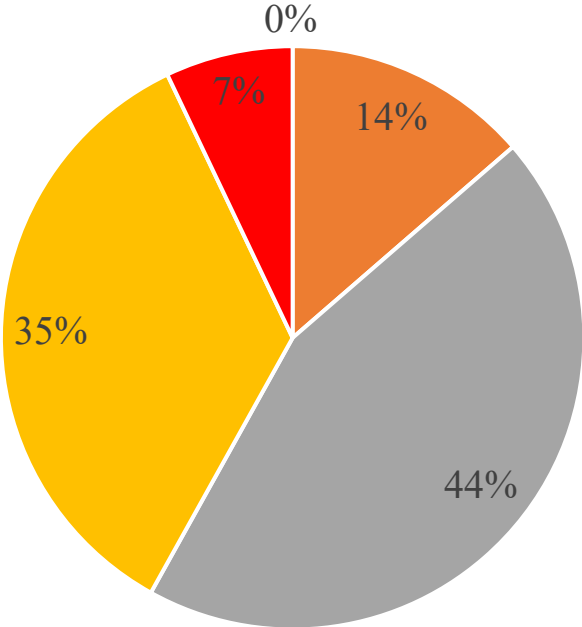
Impact of Agricultural Expansion on Soil Erosion



Actual Soil Erosion



Perception of soil fertilizer declined during the last 20 years from 1998 to 2018



- No decline
- Little decline
- Fair decline
- Strong decline
- Very strong decline



Agroecology Transition

What is Agroecology?

- Agroecology is sustainable farming that works with nature, recognizing the relationships between plants, animals, people, and their environment - and the balance between these relationships.
- Agroecology is the application of ecological concepts and principles in farming.

Agroecology promotes farming practices that;

- **Mitigate climate change**
- **Work with wildlife** - managing the impact of farming on wildlife and harnessing nature to do the hard work for us, such as pollinating crops and controlling pests.
- **Put farmers and communities in the driving seat** - they give power to approaches led by local people and adapt agricultural techniques to suit the local area

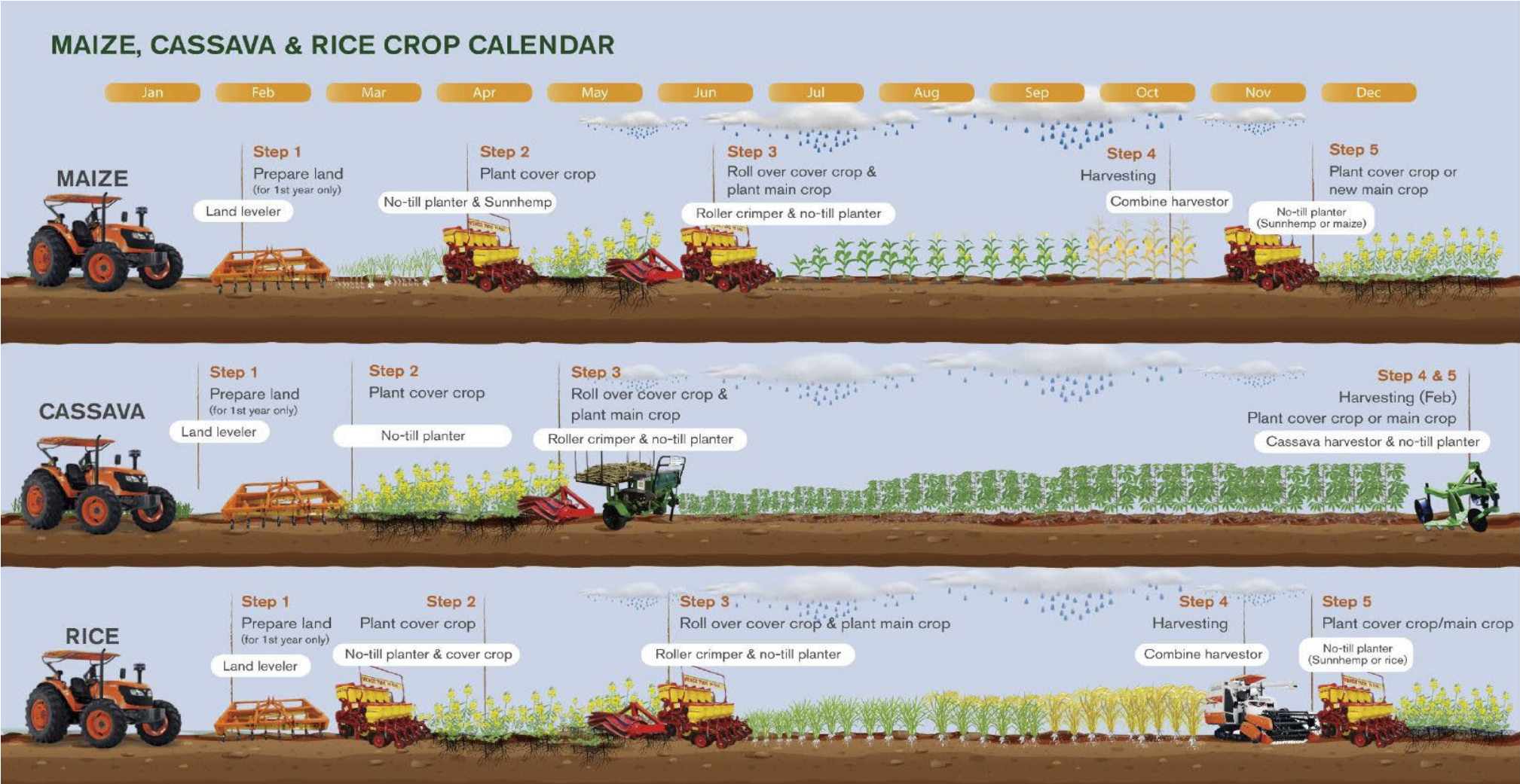


Agroecology or Conservation Agriculture & Sustainable Intensification

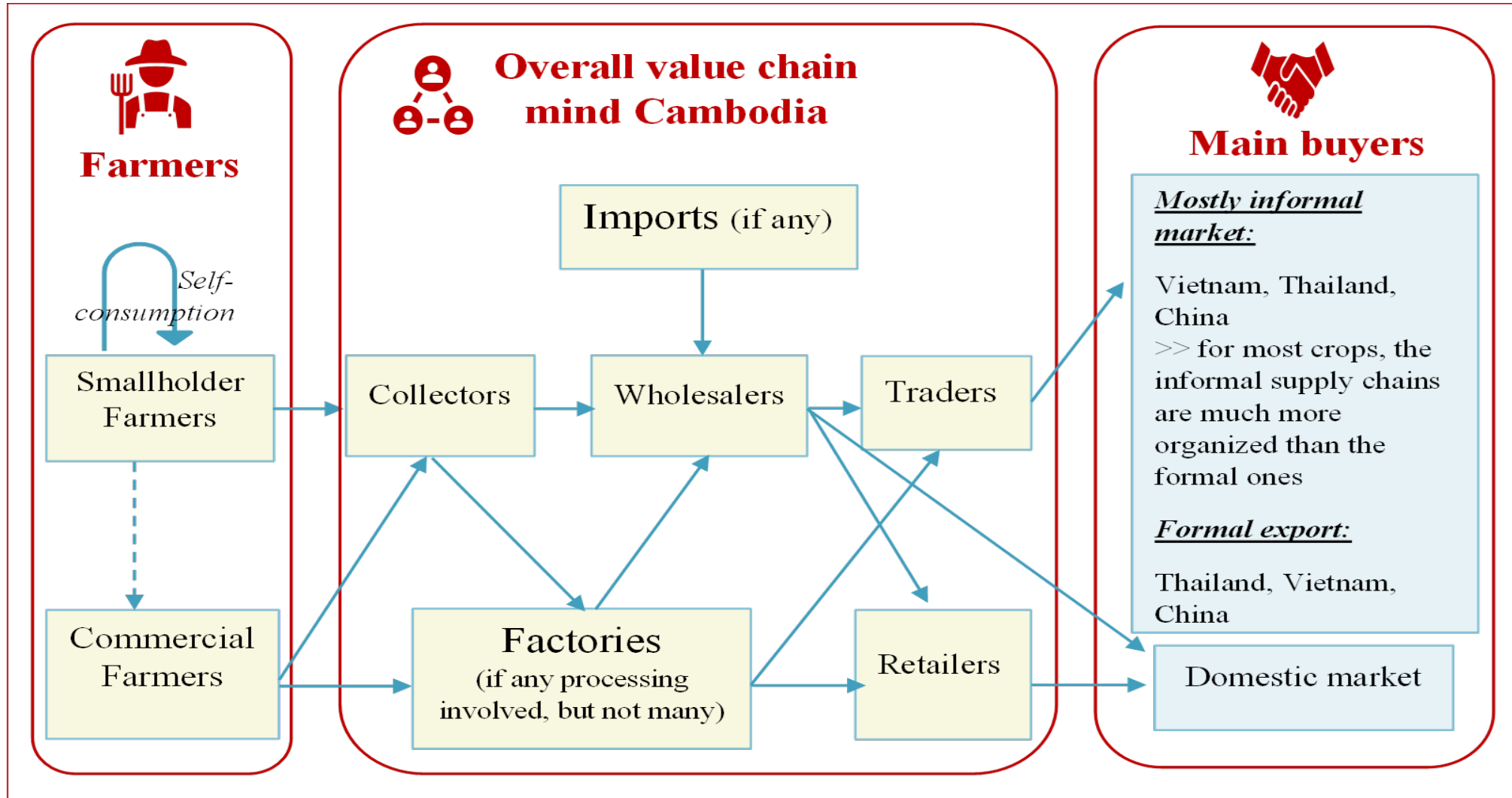
Agroecology Practice to reach economy of Scale is Labor Intensive >>
Therefore Agroecology must engage with modern agricultural machinery



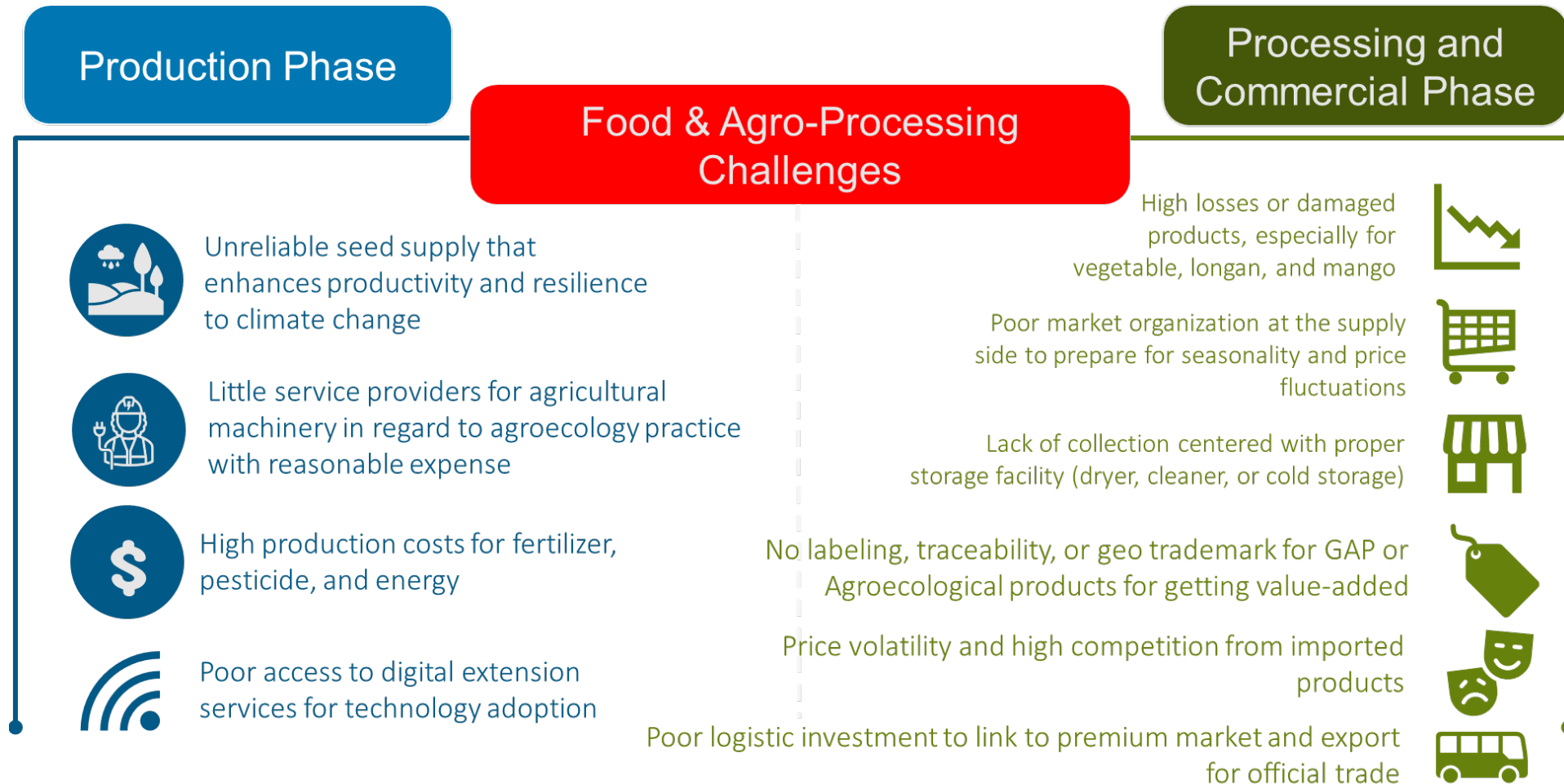
Existing Agroecology Practices in Battambang



Agricultural Value Chains

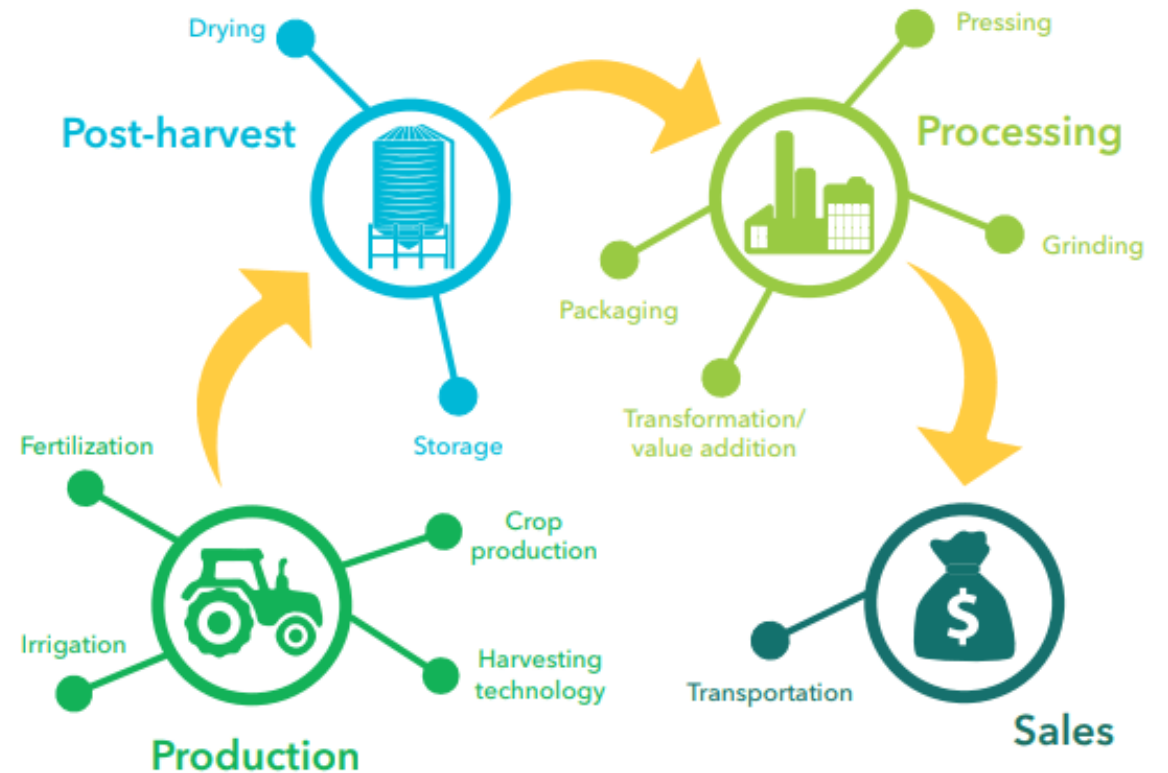
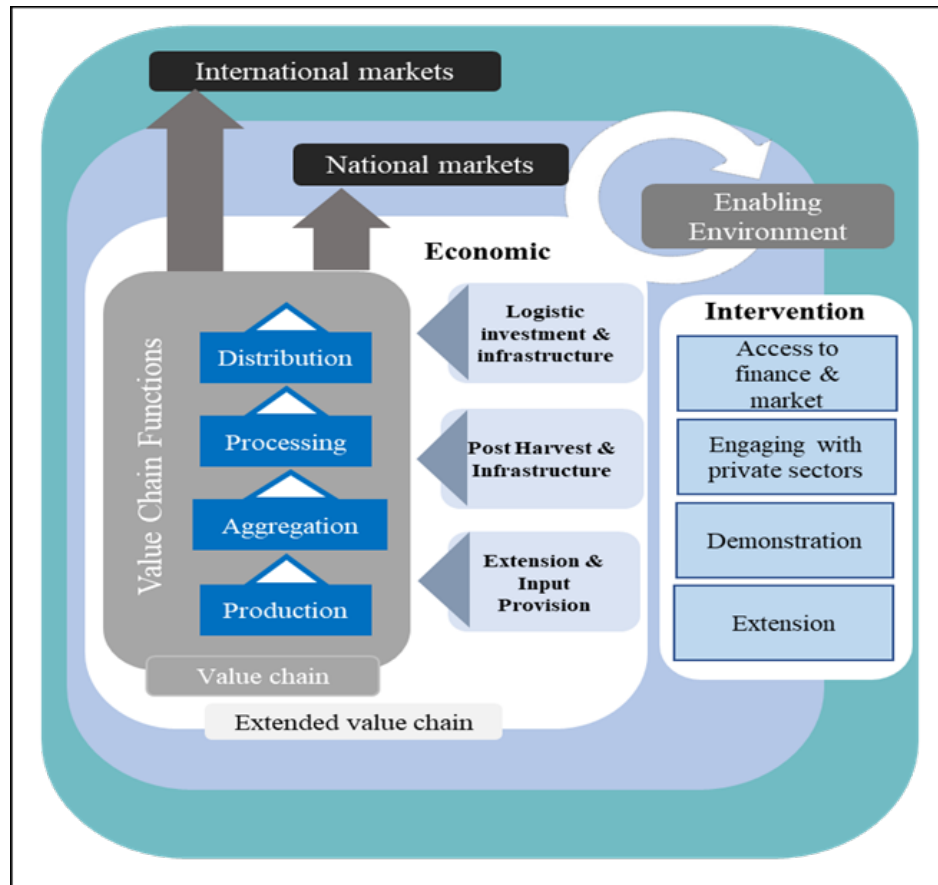


Overall Market Challenges



Invest Opportunities

Value Chain Challenges = Opportunities



Invest Opportunities

Value Chain Challenges = Opportunities

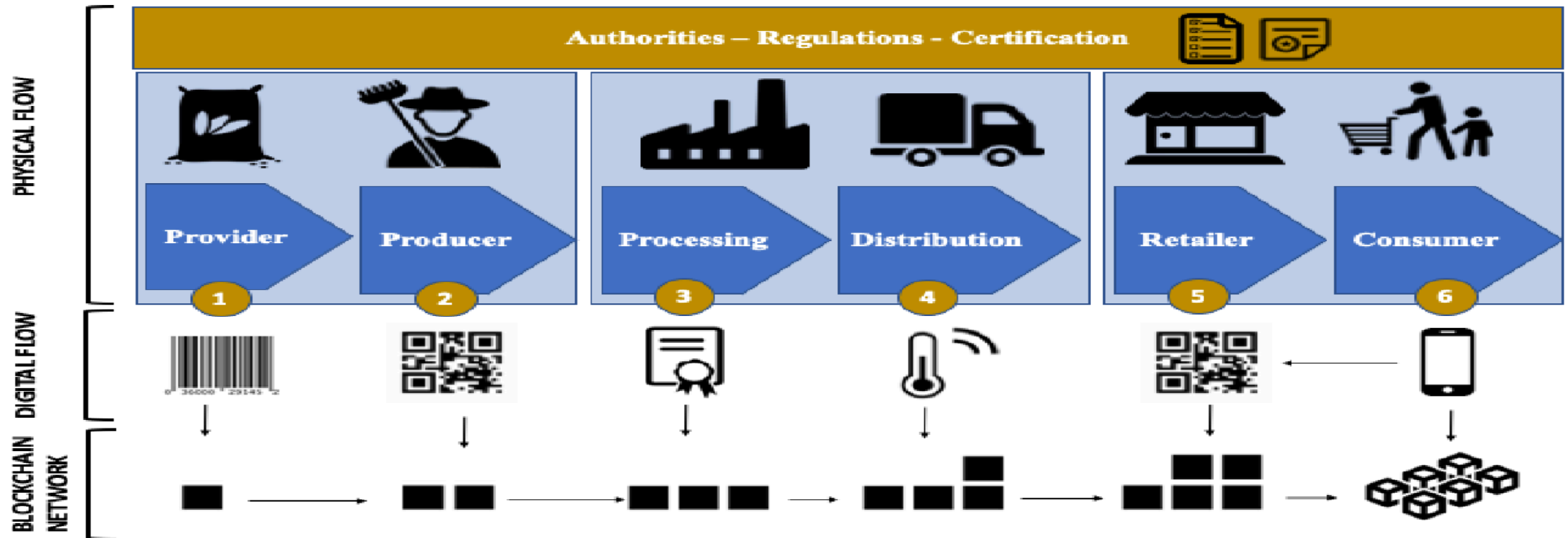


Figure 2: A simplified food supply chain system.

Stakeholders of Agroecology Market Development in Cambodia

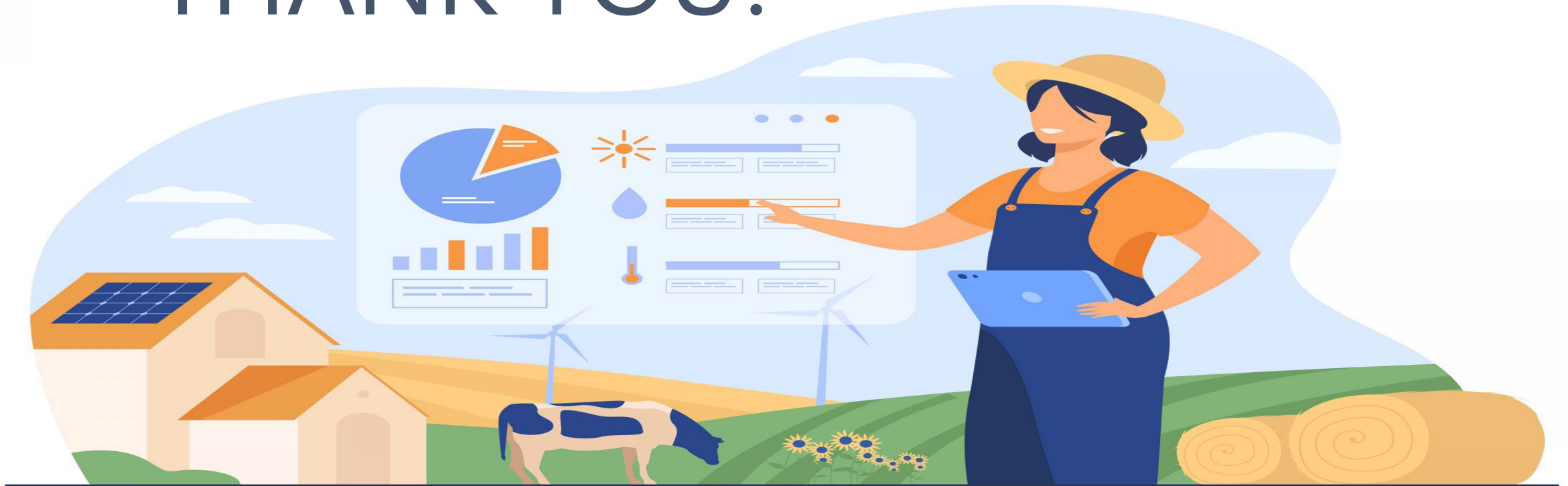


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THANK YOU!



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