A geo-spatial assessment of flood impacts on agriculture in Quang Nam province, Vietnam

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Photo: Hoang Dinh Nam

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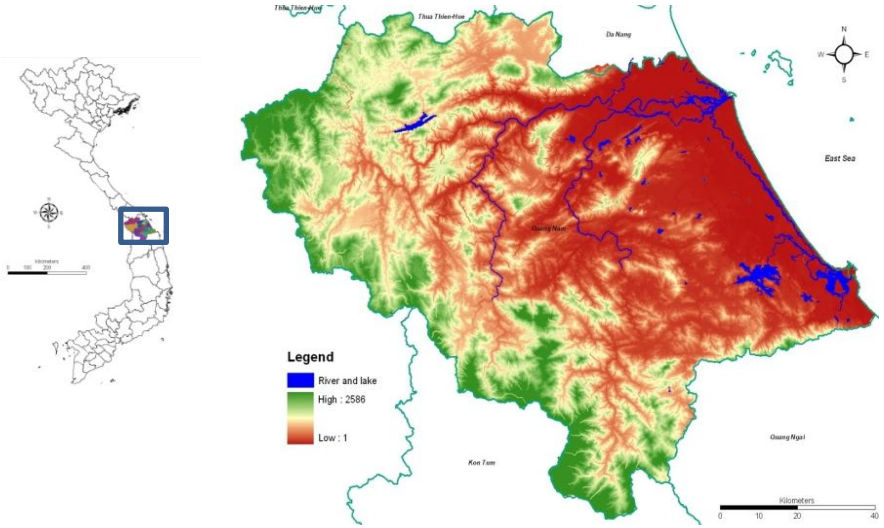
Presentation Outline

- Problem statement
- Background
- Methodology
- Results
- Conclusion and recommendations

Problem statement

- Despite advances in technology, agriculture still relies upon natural weather patterns and climate cycles for its productivity
- The recent weather events highlight Vietnam's vulnerability
- Little research has been done to linking flood models with economic models
- *Aim of this stage*: To undertake a geo-spatial assessment of flood impacts on agriculture in Quang Nam province.

Backgound

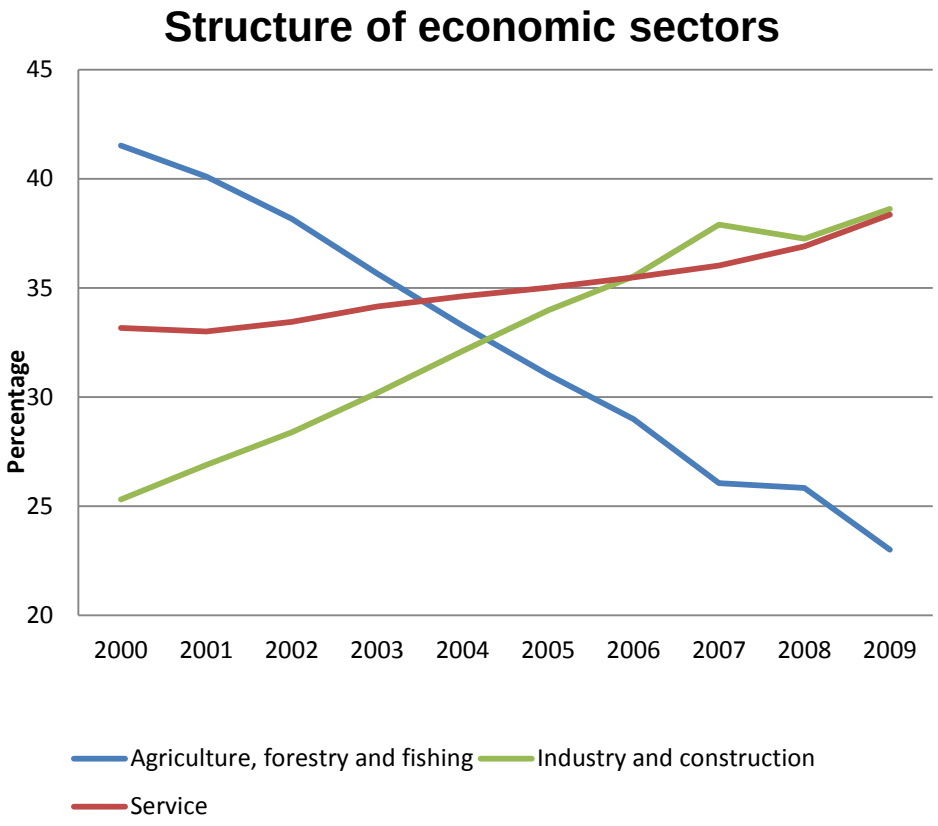


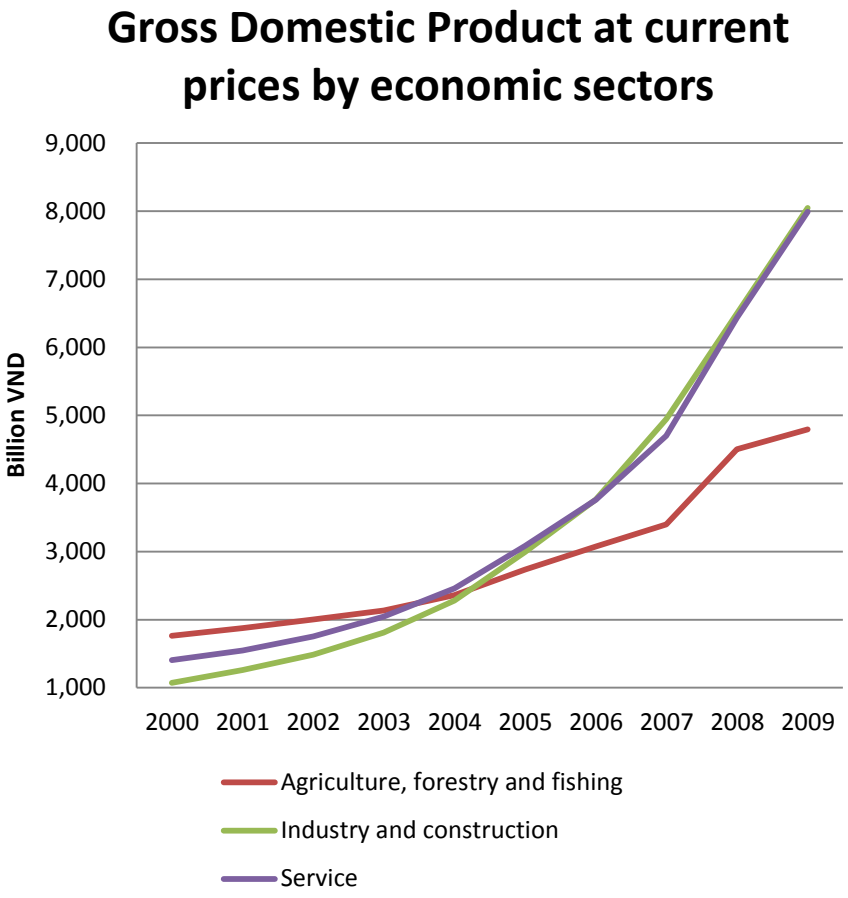
Quang Nam's topography and river systems.

- Area: 10,400 km^2
- Coastline: 85 km
- Mountainous and highland areas: 80% of land
- Tropical monsoon climate zone
- Prone to natural disasters
- Population: 1.5 million
- Mostly agricultural province
- GDP: USD 447 mill (2010).

Sources: General Statistics Office of Quang Nam

Background





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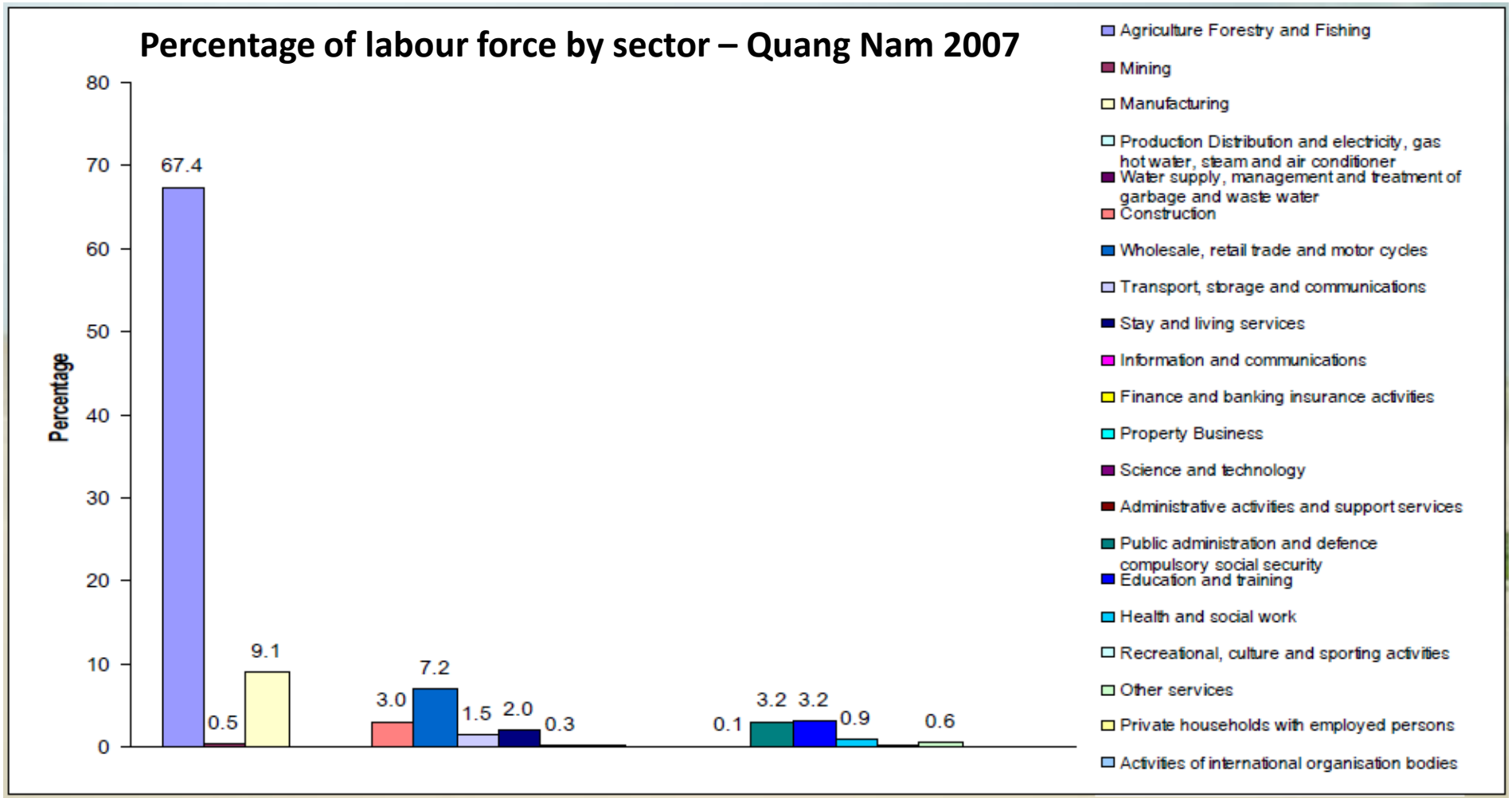


*Source: www.**gms-eoc.org**/CEP/Comp4/docs/ISDP/**Group_VNM.pdf***

Quang Nam agriculture:

- More than 80% of population live in rural areas and rely upon agriculture
- 65% of the provincial labor force
- Main source of income
- 20% of province's GDP annually

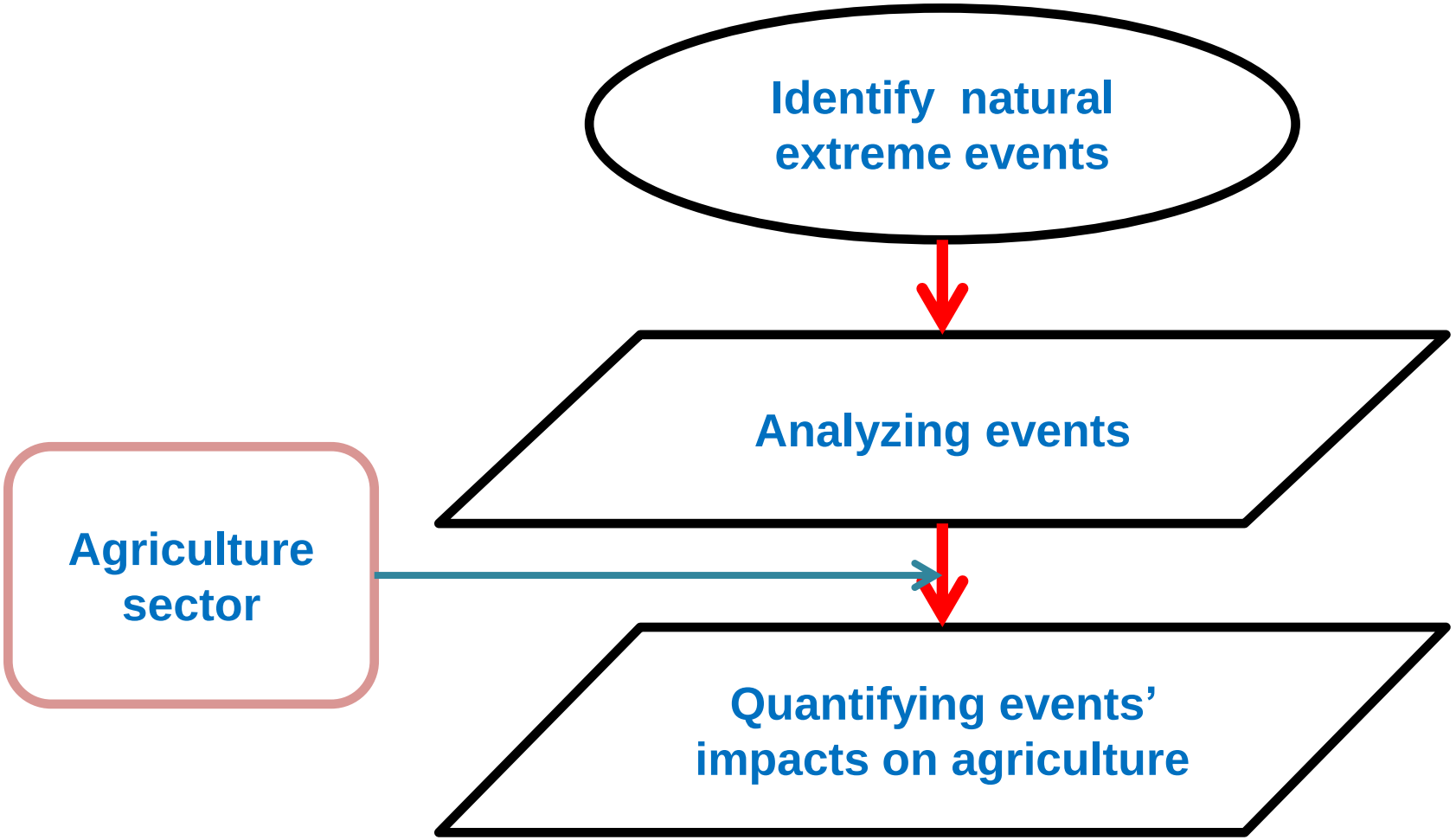
HOWEVER,

Background

A village completely flooded in Quang Nam on Oct. 1, 2009.

National highway No.1 at Duy Xuyen District inundated in the November 2007 flood.

Methodology



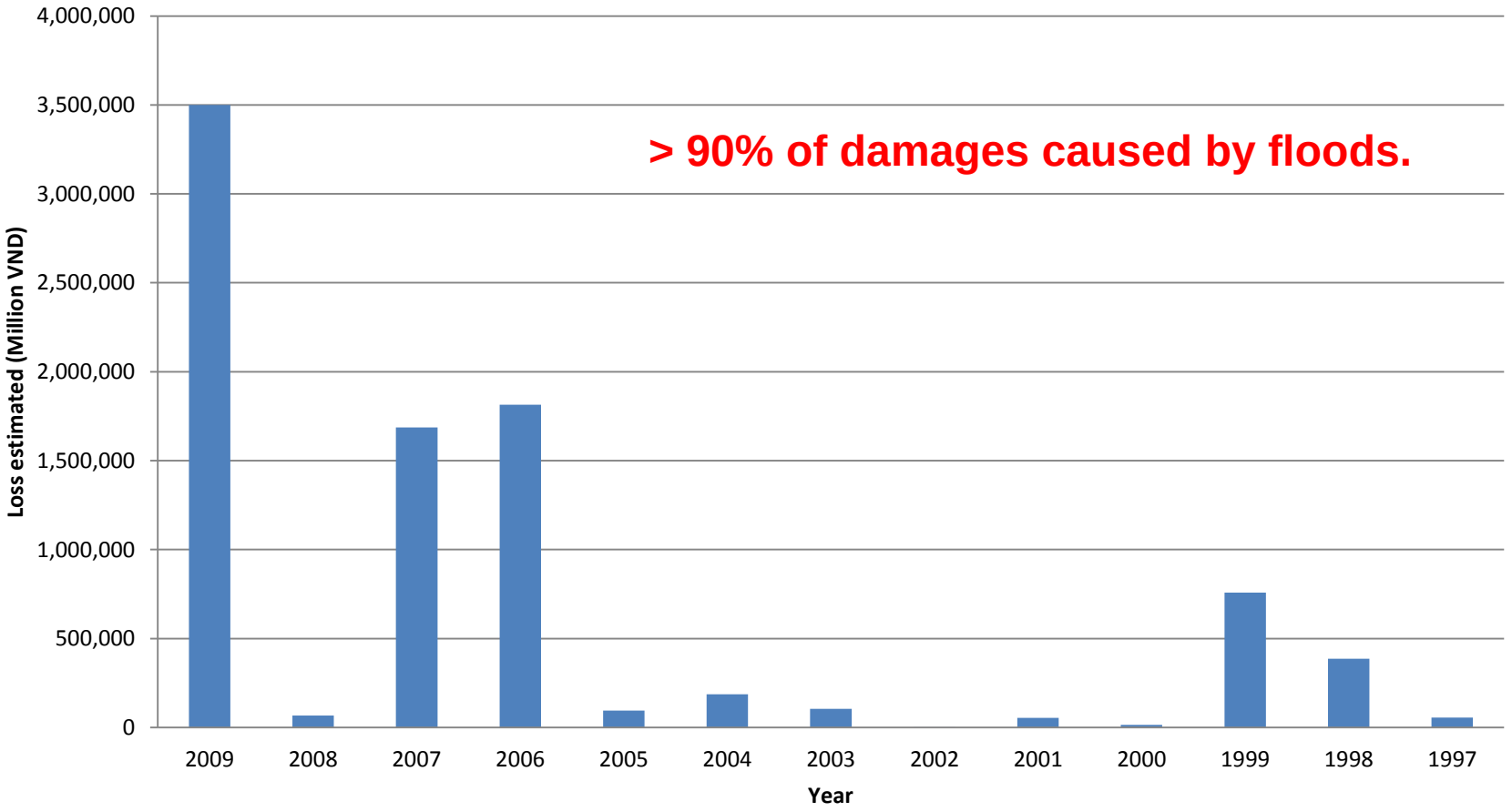
Results

Type, frequency and influential level of extreme events in Quang Nam.

No	Type of event	Frequency	Risk level
1	Flood	Frequent	Very high
2	Storm	Frequent	Very high
3	Drought and salt intrusion	Frequent	Moderate
4	Southeast monsoon	Frequent	Moderate
5	Thunderstorm, Whirlwind, Lightening	Frequent	Moderate
6	Flash flood, landslide	Frequent	High
7	Seaside erosion	Frequent	Moderate
8	Fog, hail	Frequent	Low
9	Northeast monsoon	Frequent	Low

Results

Total damage caused by natural disasters in Quang Nam province from 1997 to 2009



Source: **Central Committee for Flood and Storm Control**

http://www.ccfsc.gov.vn/dmis/Reports.aspx?cat=3

Results

Flood in Quang Nam province

- Average annual rainfall: 2612 mm
- 75% of annual rainfall drops in Sep – Dec
- Steep slopes and short rivers
- On the East: national highway No.1, rail way, sand dunes, high tides
- On the West: Mountain.

Floods are:

- Frequent
- High intensity
- Sharp peak
- High magnitude.

- The inundation basin considered comparatively closed;
- Assume that the basin is a retarding basin;

Using DEM to identify the possible inundation risk impacts on agriculture.

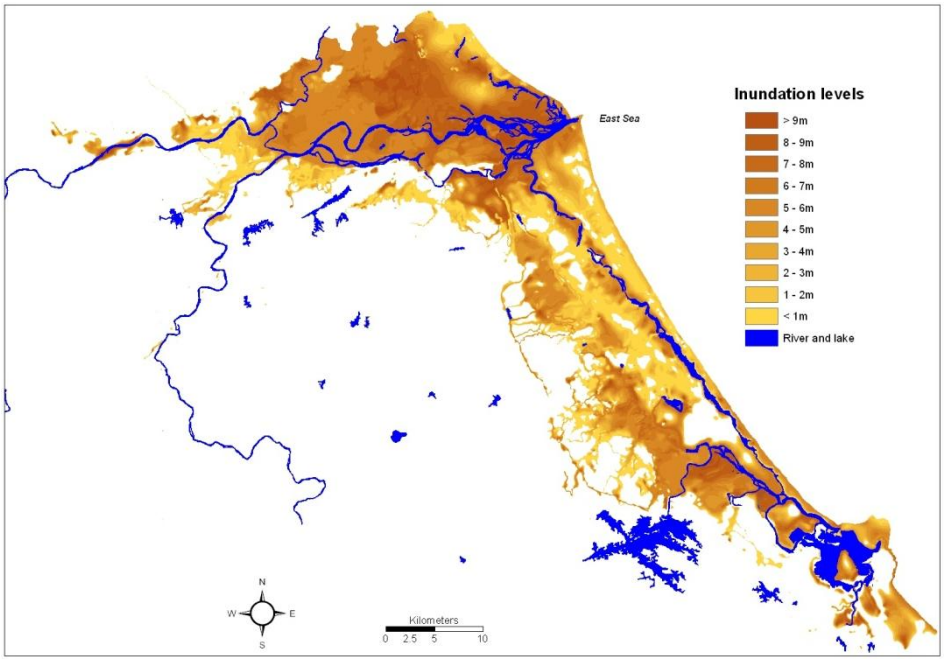
Flood scenarios:

	Discharge (m^3/s)		
Return period	***200***	***100***	***20***
Probability	***0.5%***	***1%***	***5%***
Thanh My Station	9,372	8,574	6,628
Nong Son Station	13,579	12,620	10,233

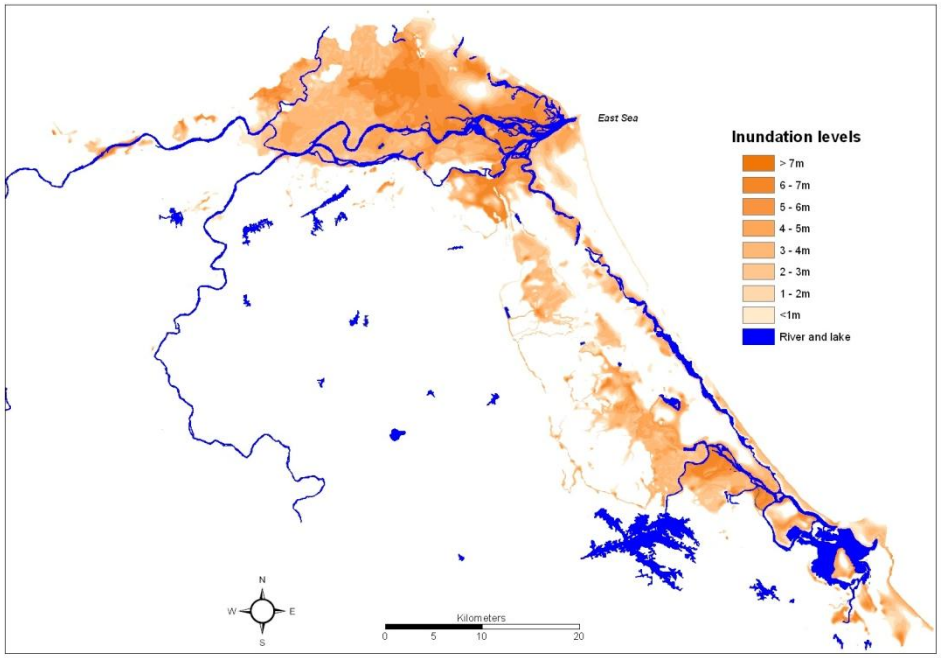
Source: Nguyen Ba Quy, 2011

Results

Flood scenarios:



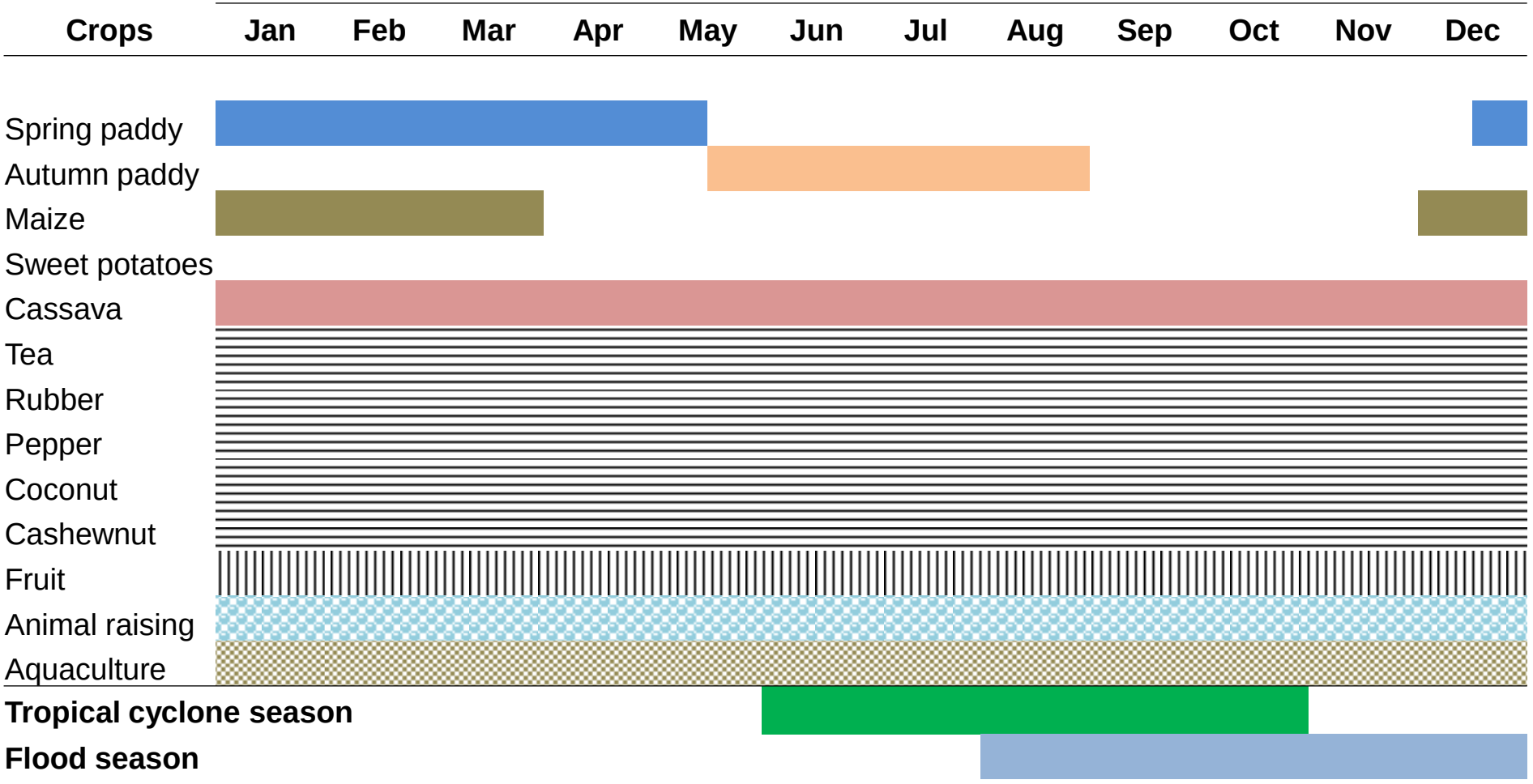
Distribution of inundation depth of historical flood (flood in 2009) extracted from DEM30.



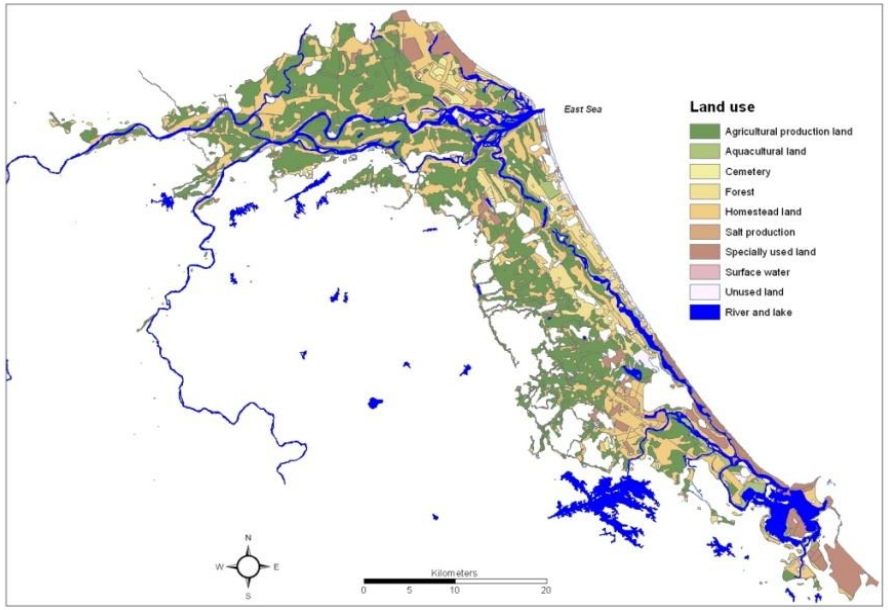
Distribution of inundation depth at 20 years return period flood (flood in 2007) extracted from DEM30.

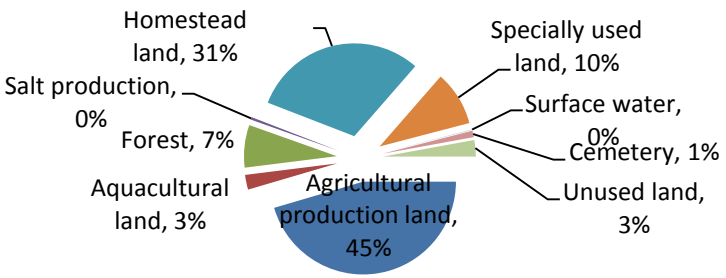
Results

Crop structure and season in Quang Nam

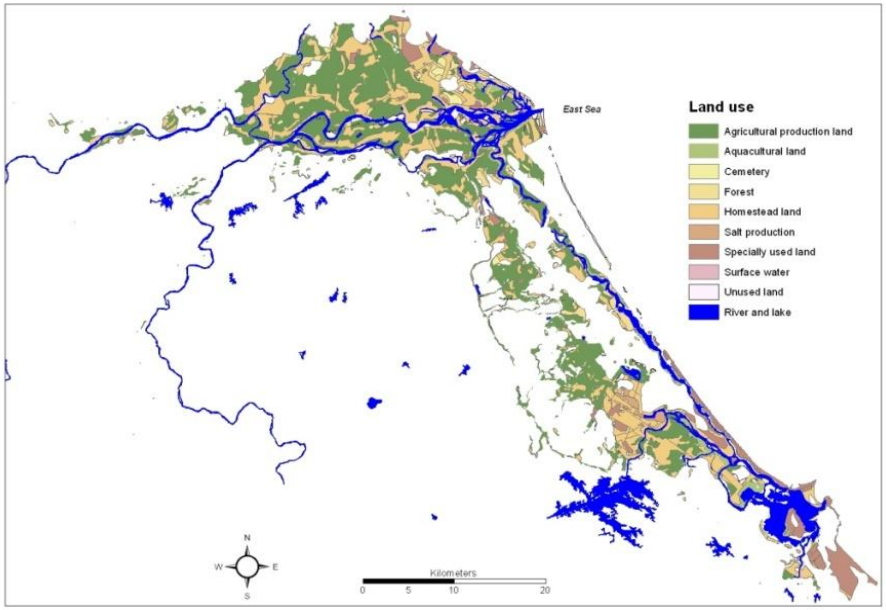


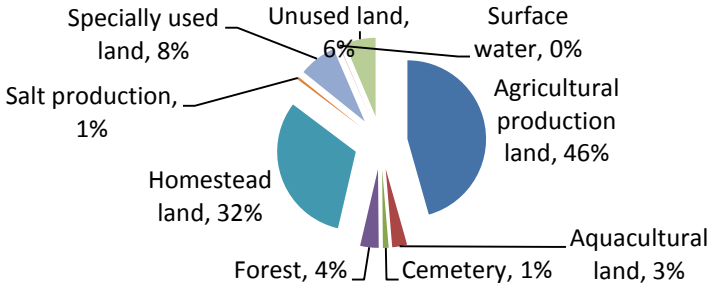
Results





Land use affected by historical flood (110,951ha – 11% total area).





Land use affected by 20 years RP flood (76,515ha – 7% total area).

Results

The impacts of flood scenarios in Quang Nam.

	Impacts		
Flood scenarios	***People***	***Agri. land (ha)***	***Rice (ha)***
20 years RP	424,000	37,630	27,951
Historical flood	769,285	50,255	36,728
Total of province	*1,452,413*	*120,119*	*77,396*

Note: The agricultural land include: agricultural, aquacultural and salt production land.

Conclusion

Agriculture is very vulnerable to floods:

- 20 year RP: 30% of agricultural land, 36% of rice land
- Historical: 41% of agricultural land, 47% of rice land.

Most impact: populated, flat and highest agricultural production areas

Combined with likely sea level rise, impacts are likely to be greater.

Recommendations

Flooding can not and should not be eliminated:

- Keep flood and people separate or
- Live with flooding.

Hard and soft solutions are needed to mitigate the impacts:

- Early warning system
- Emergency response plan
- Recovery plan
- Construction measures.

Flood risk analysis based on CBA is necessary to evaluate the effectiveness and feasibility of proposed solutions.

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