

Climate change impact on community water kiosks and resilience A study in rural Cambodia

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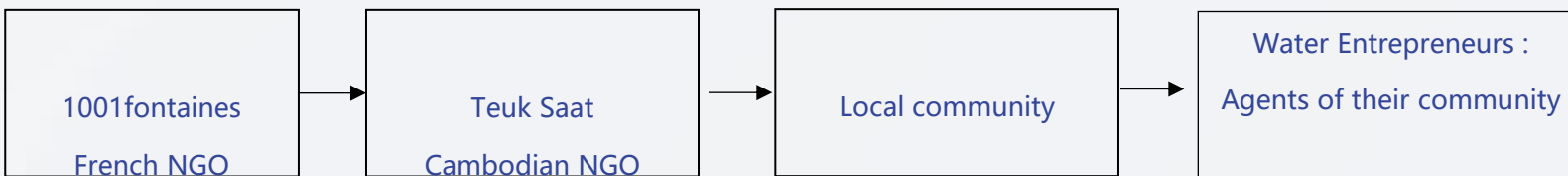
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Water kiosks

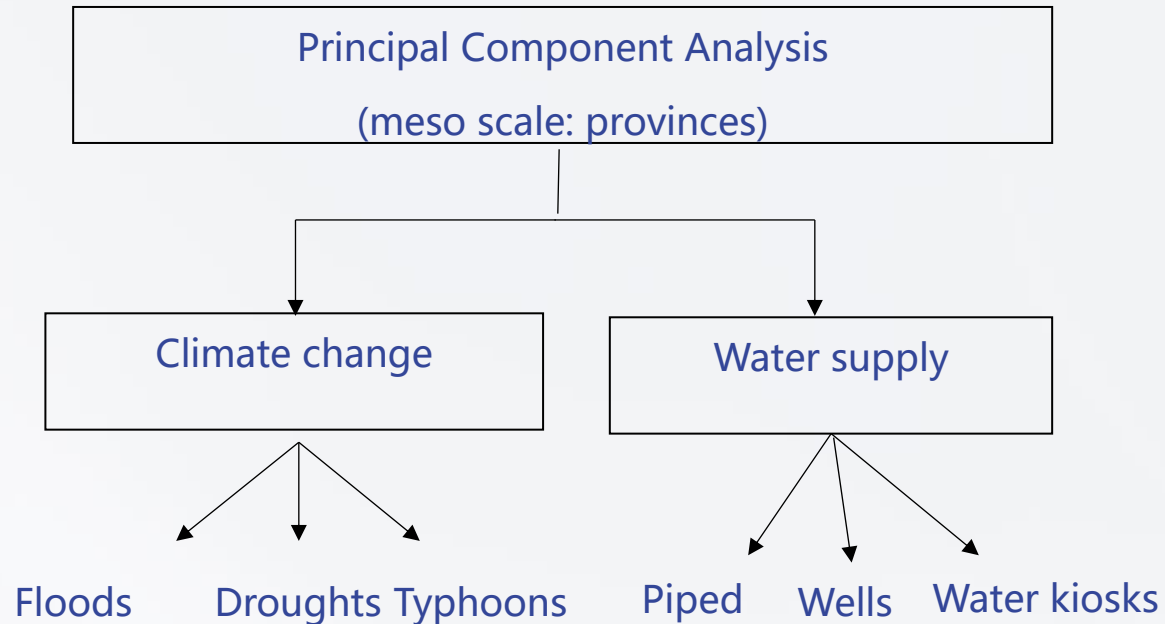
- ✓ Small-scale decentralized units of production of drinking water from existing local water sources,
- ✓ Water is delivered in 20-litre containers to the homes of beneficiaries who do not have access to safely managed services,
- ✓ Water is marketed up to 3% of the total average monthly household income (WHO recommendation),
- ✓ Water kiosks serve a population of three million beneficiaries worldwide.



A longitudinal case study of a communitarian-based enterprise 1001fontaines in Cambodia (2004-2020).
A decentralized approach with 303 water kiosks (YTD).



Context analysis



Coding and analysis of 1001fontaines' resources

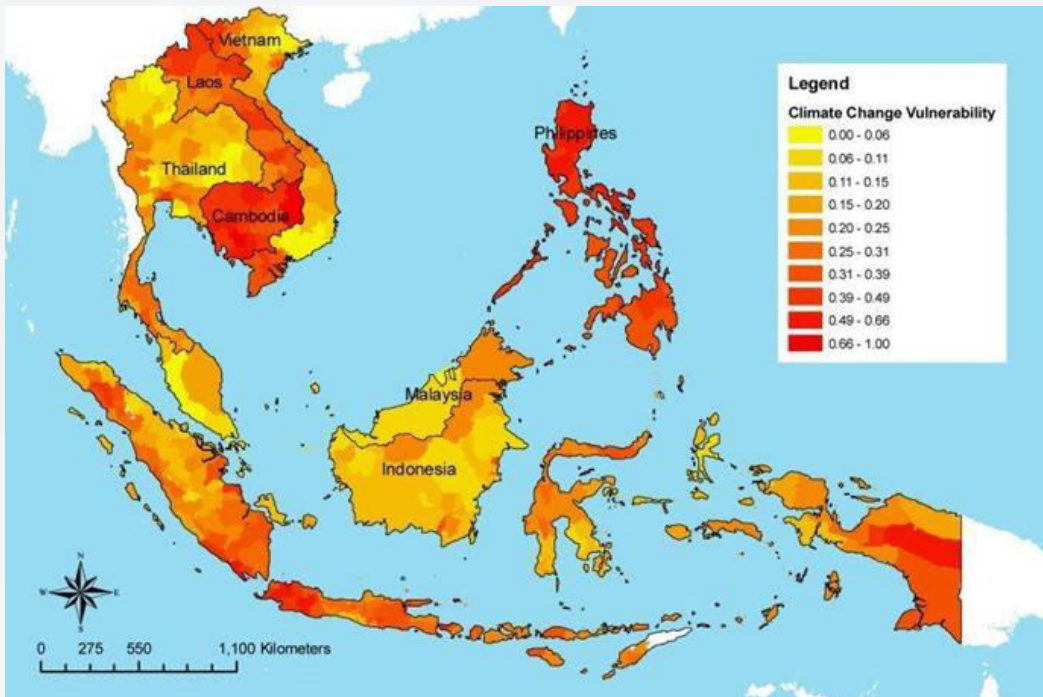
Human resources (founders, managerial team, water entrepreneurs, advisors)

Organisational resources (« O-We » community and brand, 1001fontaines – Teuk Saat, entrepreneur training academy)

Natural resources (water, solar energy, electricity)

Physical resources (platforms, means of transport)

Relational resources (« shopkeepers »)



Source : Phnom Penh Post – World Economic Forum article of June 6, 2019

Cambodia

- ✓ 1.0 – 2.6°C increase in temperatures by 2050
- ✓ Observations of longer drought
- ✓ More frequent tropical storms
- ✓ Rising sea levels and saline intrusion of key freshwater resources

Key climate impacts on water

- Degradation of water
- Limited freshwater availability
- Increased risk and vector of waterborne diseases

Source : adapting to climate change : providing resilient water services (1001fontaines)

Cambodia has set up a National Committee for Disaster Management to collect data from all natural disasters.

“Addressing the 4As - "affordability, acceptability, availability and awareness" in rural environments” – 1001fontaines & Water kiosks in Cambodia

- ✓ **Affordability** of the water to the most unprivileged people,
- ✓ **Availability** by addressing the challenges to deliver water in the most remote areas,
- ✓ **Acceptability** by the population of the benefit of consuming a paid water,
- ✓ **Awareness** by the population that safe drinking water significantly reduces diseases.

Meso scale

Provinces

Versatile resources

- ✓ Platforms
- ✓ Advisors

Micro scale

Villages

Local resources

- ✓ Water kiosks
- ✓ Water entrepreneurs

Services to water kiosks



Services to beneficiaries



Resilience at the meso scale

- ✓ Drought mitigation plan set by 1001fontaines : a portfolio of solutions that can be adopted based on each local situation
 - ✓ connection to another local water source,
 - ✓ provision of 20L containers by a nearby water kiosk,
 - ✓ supply of raw water through water trucks.

Resilience at the micro scale

- ✓ Capable to adapt to resilient events (eg : renting boats to ensure home delivery of safe drinking water during floods),
- ✓ Bricolage : « Making do with whatever is at hand »,
- ✓ Water kiosks are raised above ground level to limit flooding risks within the building,
- ✓ Water kiosks benefiting from a connection of the station to a water supply network have greater resilience in the face of climate change.



The four hypotheses for the evolution of average water production following a natural disaster – adaptation to research

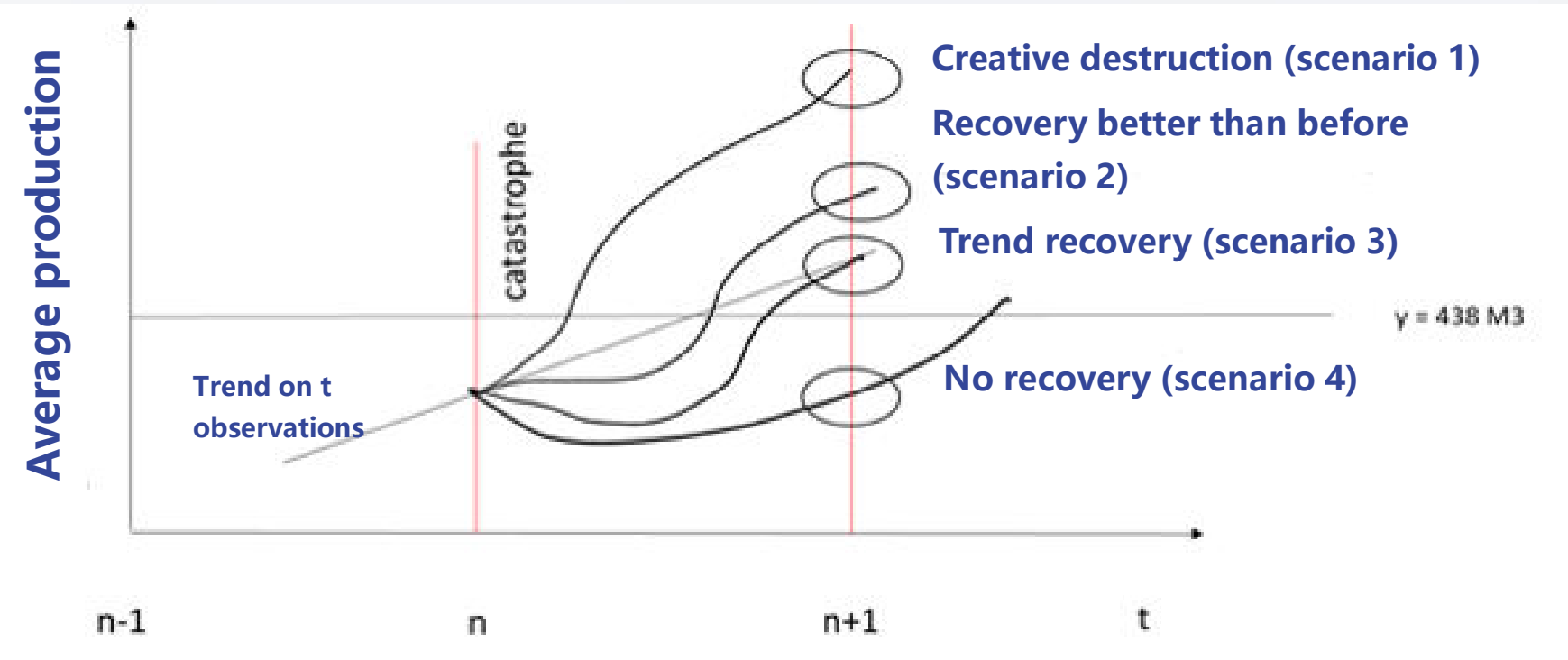


Figure adapted from Hsiang and Jina (2014)

Methodology

- ✓ Water kiosks production classified by province over the period 2012-2018
- ✓ Constitution of a database of natural -disasters based on data published over the period 1996-2019

Evolution of average production following a natural disaster

Scenario 1 : 3 occurrences,

Scenario 2 : 9 occurrences,

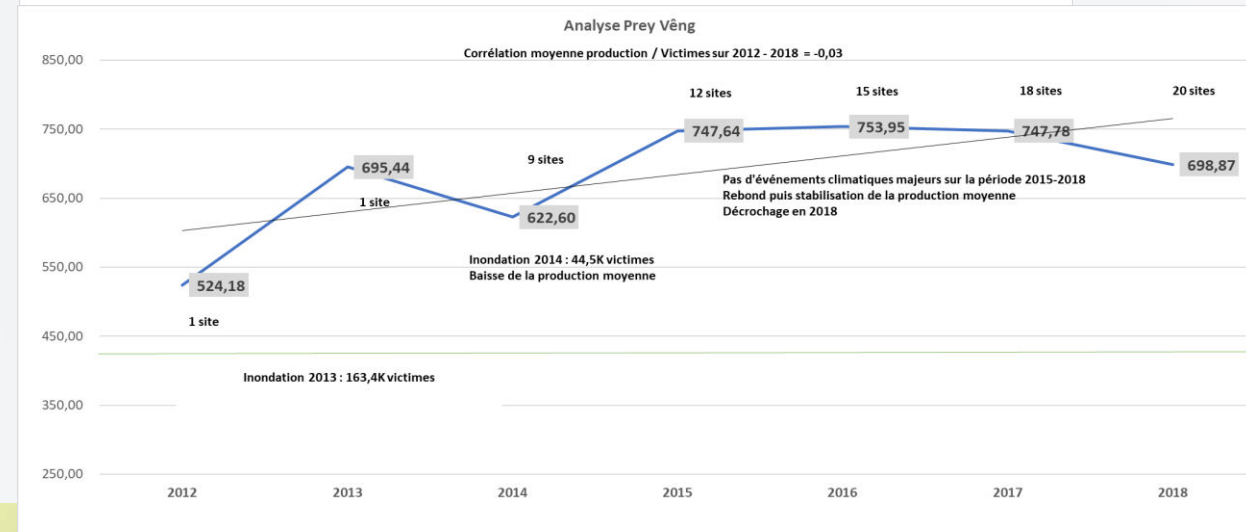
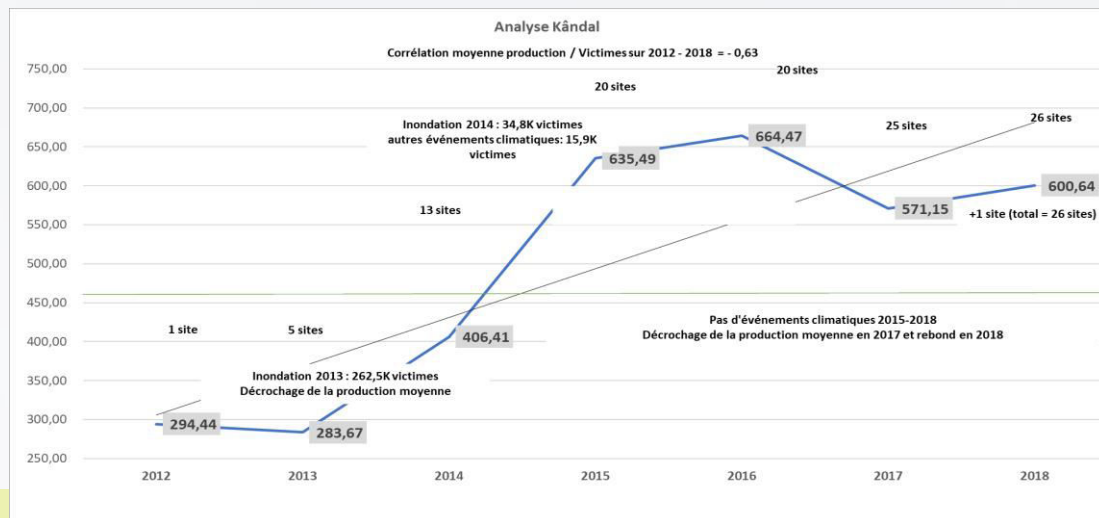
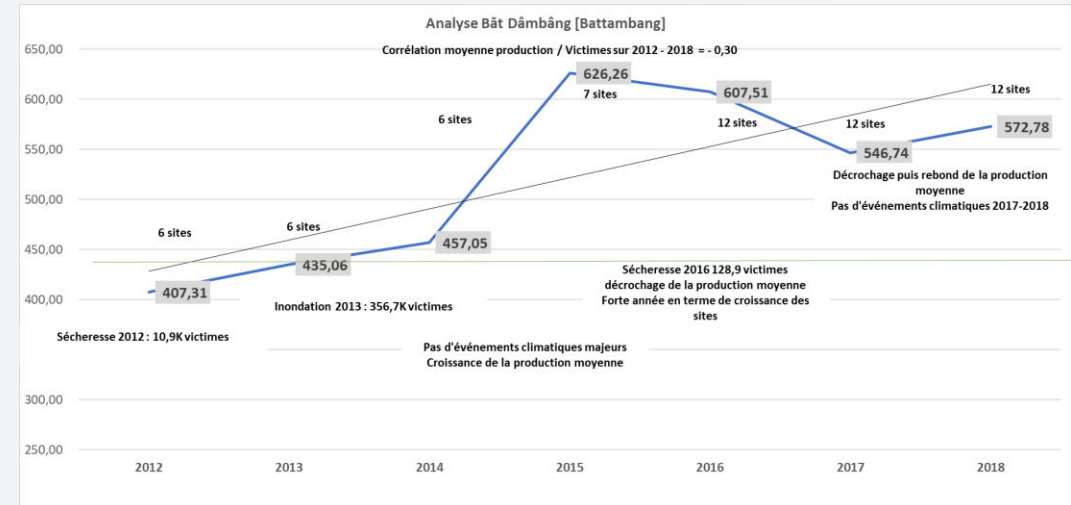
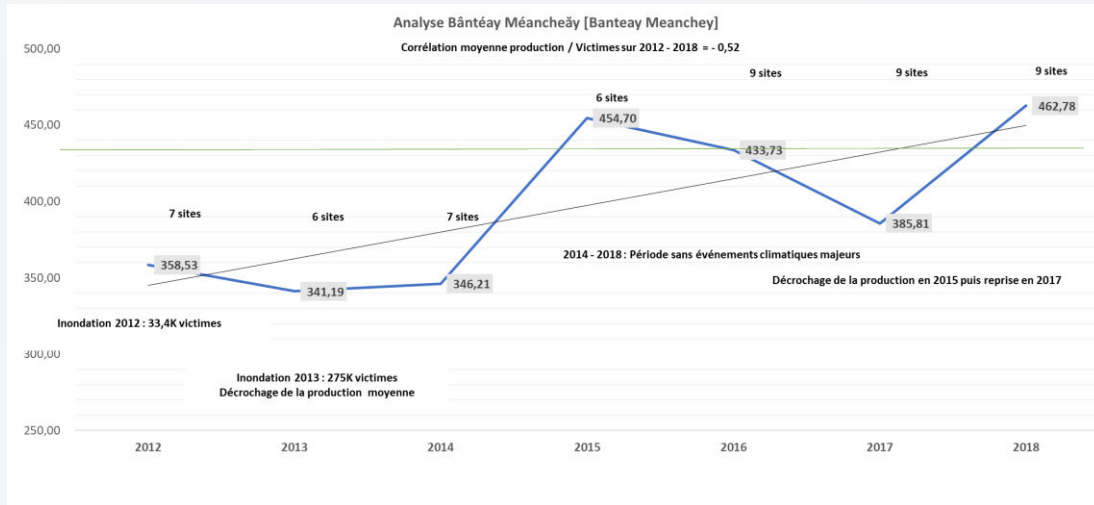
Scenario 3 : 2 occurrences,

Scenario 4 : 7 occurrences.

Impact of climate change on water kiosks

Climate change has an impact on production of water kiosks

Graphically, the occurrence of climatic events, mostly floods and drought episodes, has an impact on the average water production of the water kiosks over the observation periods (2012-2018, between 26 and 174 kiosks classified per province)



- ✓ A decentralized model likely to meet a major challenge (Eisenhardt & al., 2016) – bringing drinking water to the areas farthest from conventional supply networks – based on an entrepreneurial approach involving local populations (Tashman & Marano, 2009) and respectful of communities (Peredo & Chrisman, 2006; Ansari & al ., 2012) because it is socially and culturally rooted.
- ✓ A model which also shows resilience in the face of natural disasters resulting from climate change at micro and meso scales.

