„Climate-resilient innovations in smallholder agriculture – Theory and practical implications for farmer-led research"

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Bandung, 22.9.2017

Brot für die Welt
Brot für die Welt – Evangelischer Entwicklungsdienst

Climate resilient investigation and innovation project – South Sulawesi, West Java

Introduction

Objectives of the session

Participants

- Get an overview on the climate-resilient investigation and innovation project (CRAIIP)
- have gained understanding on innovative practices in the context of smallholder climate change adaptation

Content

- Our centre (SLE)
- Our Indonesian-German research project
- Climate change vulnerability
- Smallholder farmers
- Climate resilience
- Innovation

Albrecht Daniel Thaer 1752-1828: the „founder “ of agricultural science in Germany, first Professor of Agriculture: CROP ROTATION FIELD TRIALS

Centre for Rural Development (SLE)

SLE

- Founded in 1962
- 1,000 alumni
- ~ 20 employees
- belongs to Faculty of Life Sciences in Humboldt-Universitaet zu Berlin

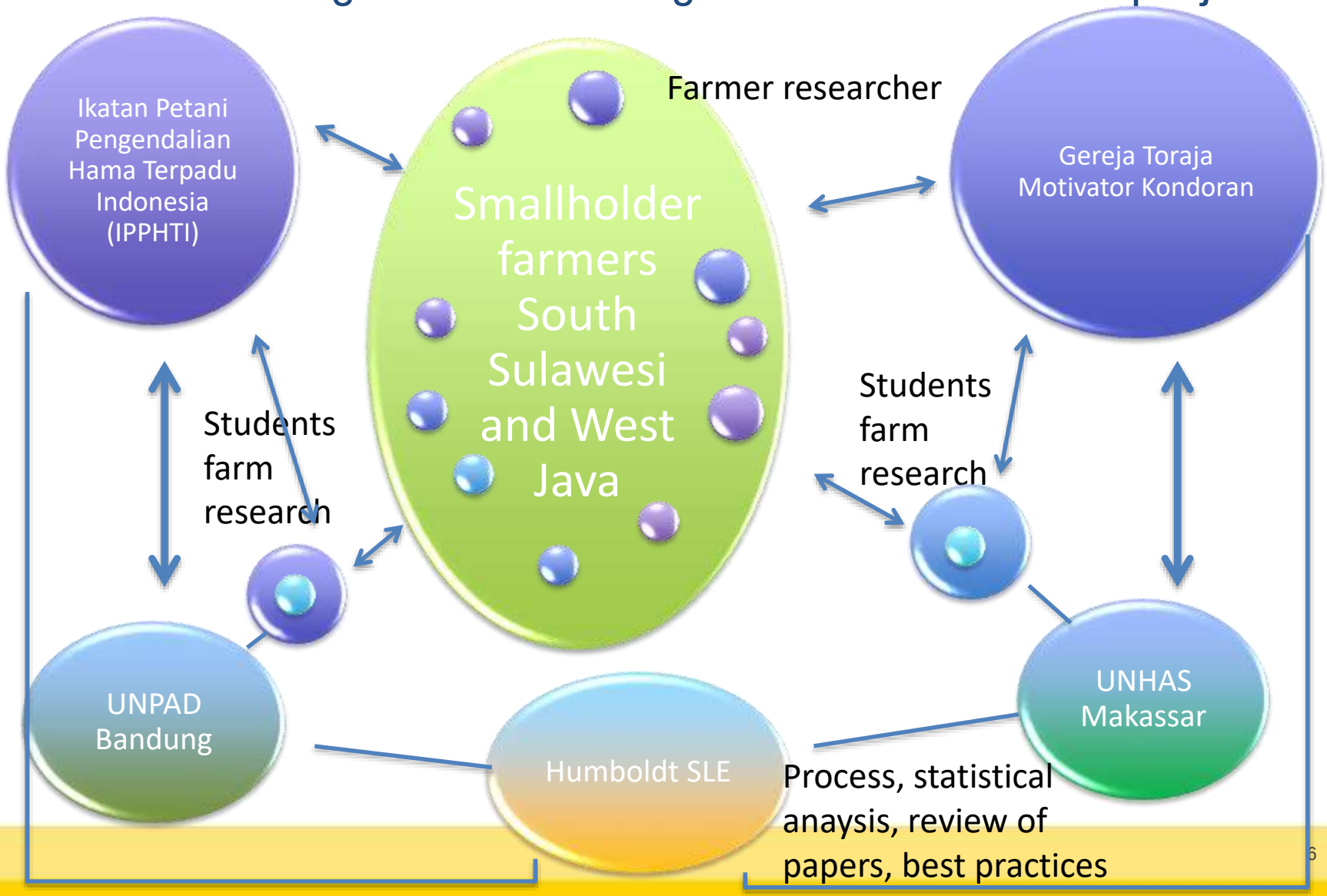
SLE- Working Fields

- **SLE STUDIES:** "International Cooperation for Sustainable Development"
- **SLE TRAINING:** Trainings for international specialists
- **SLE ADVISORY SERVICES:** Cooperation with universities in Mozambique, Brazil, Columbia, Mali
- **SLE RESEARCH**: Applied research: value chains, climate change adaptation, rural transformation, urban farming, knowledge transfer: Kenya, Mozambique, South Africa, Indonesia

Our approach to teaching emphasizes experience-based learning in teams.

CRAIIP

Climate resilient agriculture investigation and innovation project



Smallholder farmers

Smallholder farmers are very important

- Many people: 570 million farms and small-scale: less than 2 hectares
- Use family labour for production and marketing (efficient)
- Produce the bulk of the household's staple foods (IFAD 2011) and 80% of the food in developing countries
- Many smallholders belong to the hungry poor due to remoteness and exclusion

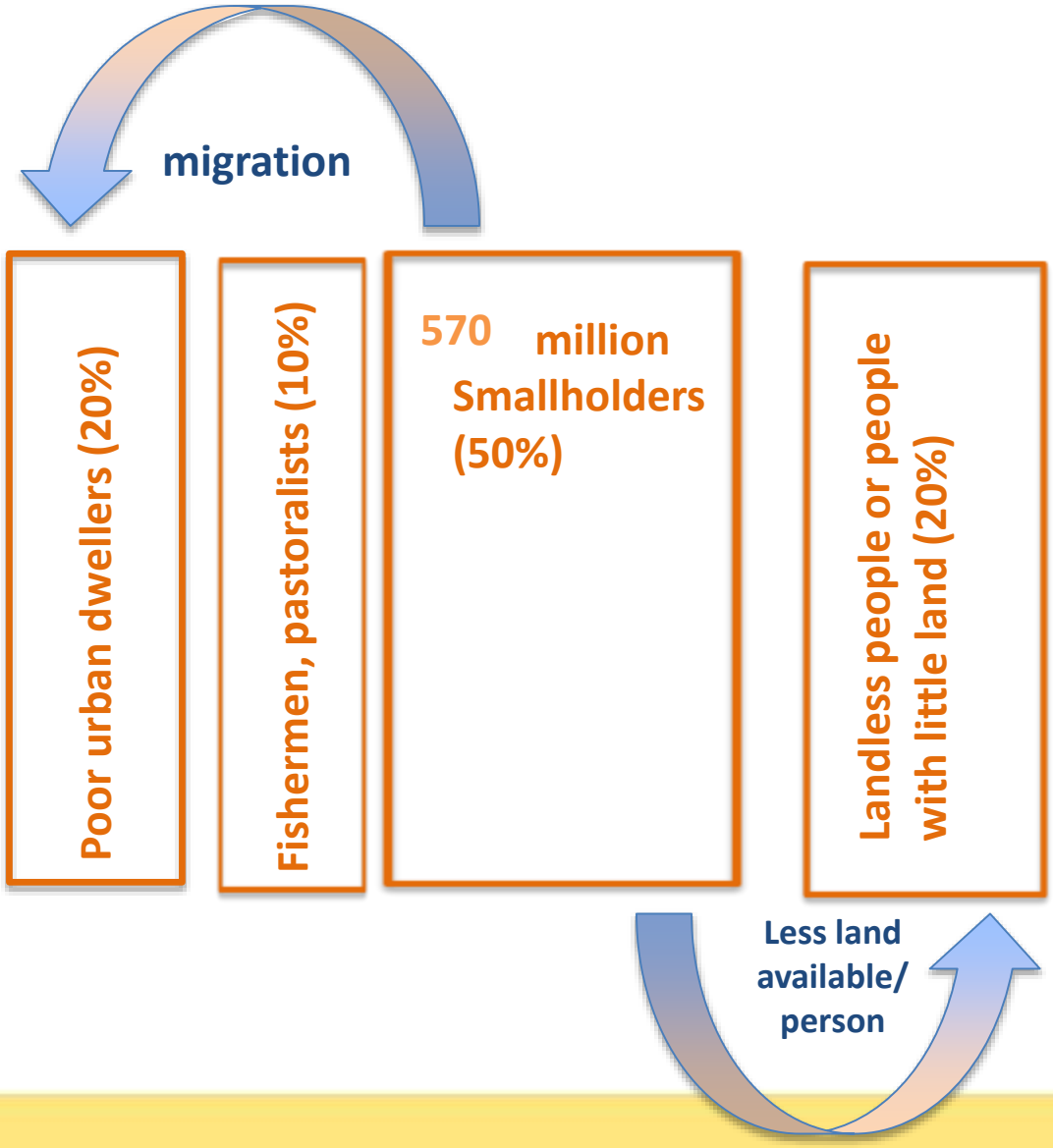
Table 4. *Top five countries by number of ag*

Agricultural holdings (in millions)		
Top five countries	Most recent estimate	Share of the world's agricultural holdings (%)
China	201	35
India	138	24
Indonesia	25	4
Russian Federation	23	4
Bangladesh	15	3
World total	570	

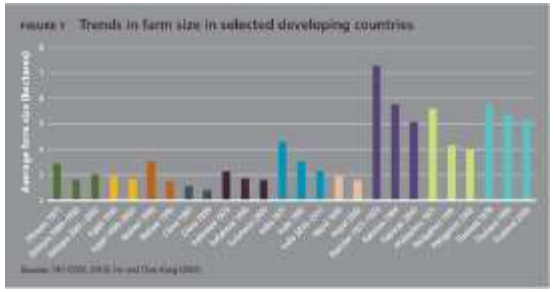
Source: Authors' compilation using FAO, 2014a.

Source: Lowder et al. (2016)

Smallholders are the Hungry Poor



- >50% of people suffering from chronic hunger are smallholders, or 80% of rural dwellers



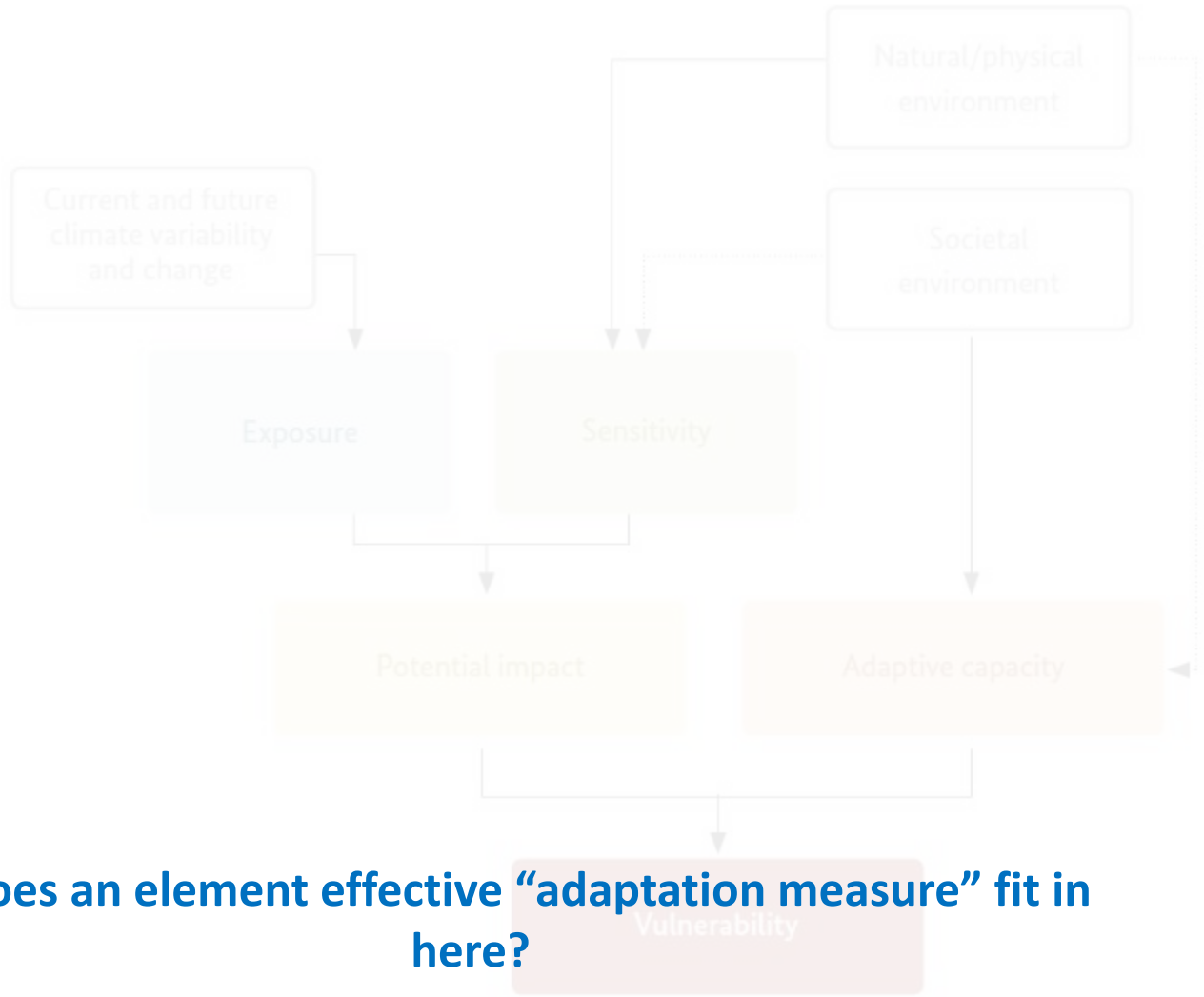
Climate change vulnerability

climate change vulnerability is a function of 3 elements

"V. is composed of the character, magnitude, and rate of climate variation to which a system

- is exposed
- its sensitivity
- its adaptive capacity"

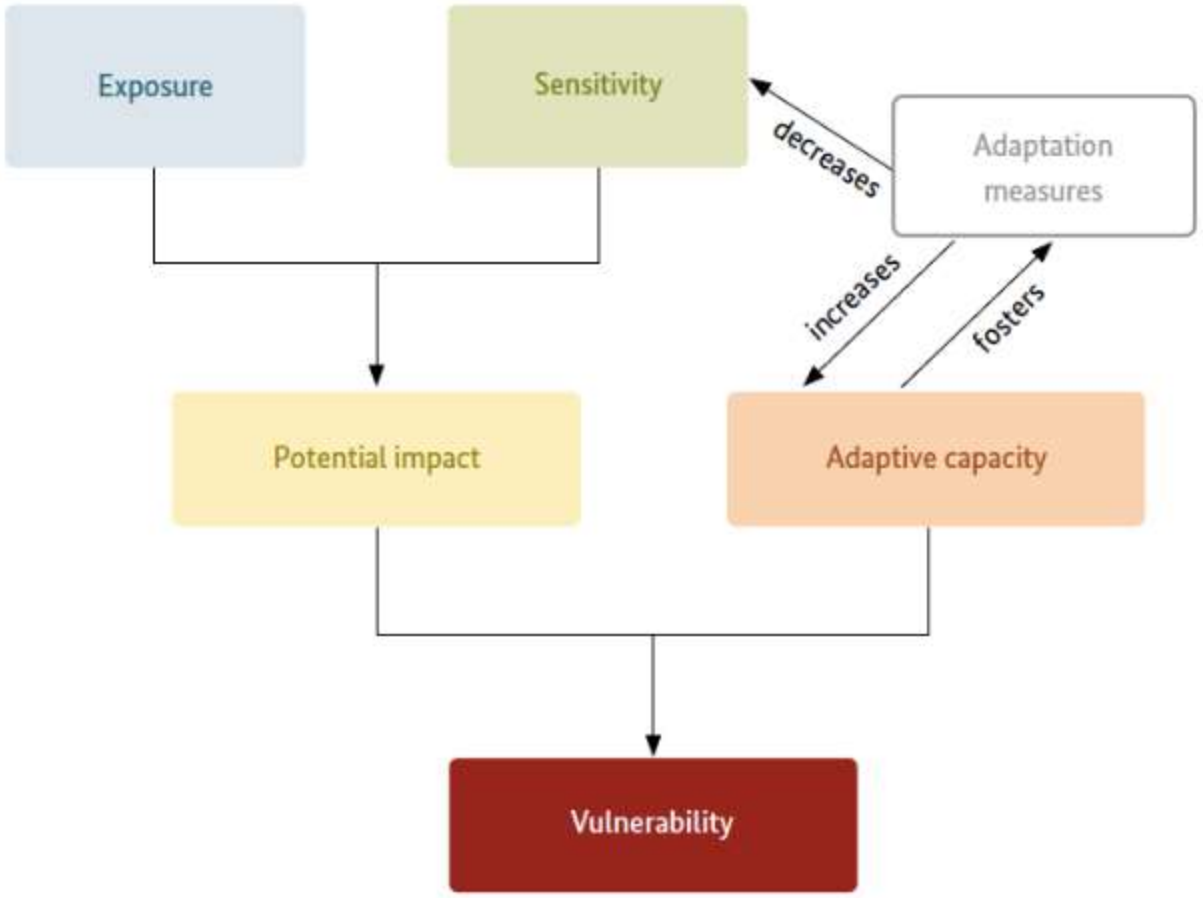
(IPCC, WGII, 2007)



How does an element effective "adaptation measure" fit in here?

Sources: Field et al. 2013; adelphi, EURAC 2014

climate change vulnerability



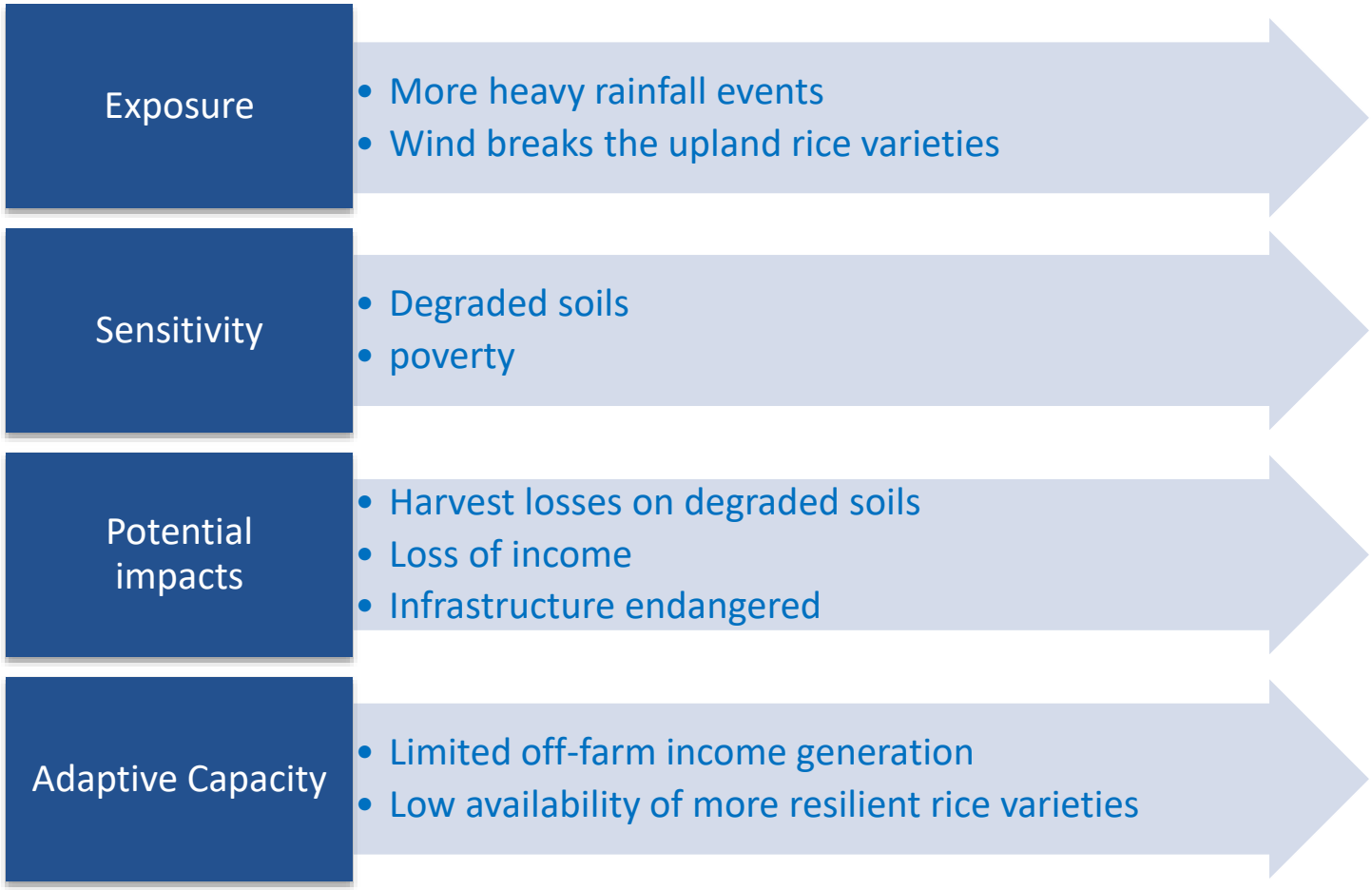
Sources: Definitions: Field et al. 2013; Parry et al. 2007; Graph: adelphi, EURAC 2014

Vulnerability — Increased frequency and intensity of rainfall in Northern Laos

Element	Magnitude
Exposure	?
Sensitivity	?
Adaptive Capacity	?
Vulnerability	**?**

Source and image credit: S. Stöber; adapted from UNCC:Learn: The One UN Climate Change Learning Partnership

Vulnerability — Increased frequency and intensity of rainfalls in Northern Laos



Source: own example based on UNCC:Learn: The One UN Climate Change Learning Partnership

Vulnerability — Increased frequency and intensity of rainfalls in Northern Laos

Source: Silke Stöber

Element	Magnitude
Exposure	
Sensitivity	
Adaptive Capacity	
Vulnerability	

Source: own example based on UNCC:Learn: The One UN Climate Change Learning Partnership

smallholders‘ climate resilience

A Laotian climate-resilient innovation smallholder farmer story.....

Picture source: LIWG

Picture source: LIWG

Picture source: own


Picture source: LIWG

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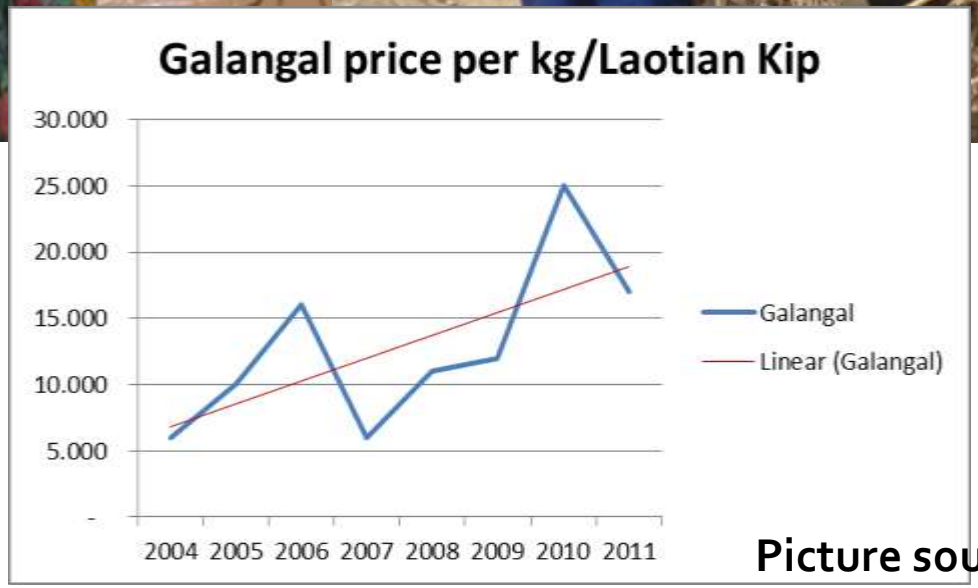


Picture source: CARE Laos

Picture source: own

What can we learn from this example?

1. Adaptation must be climate-resilient

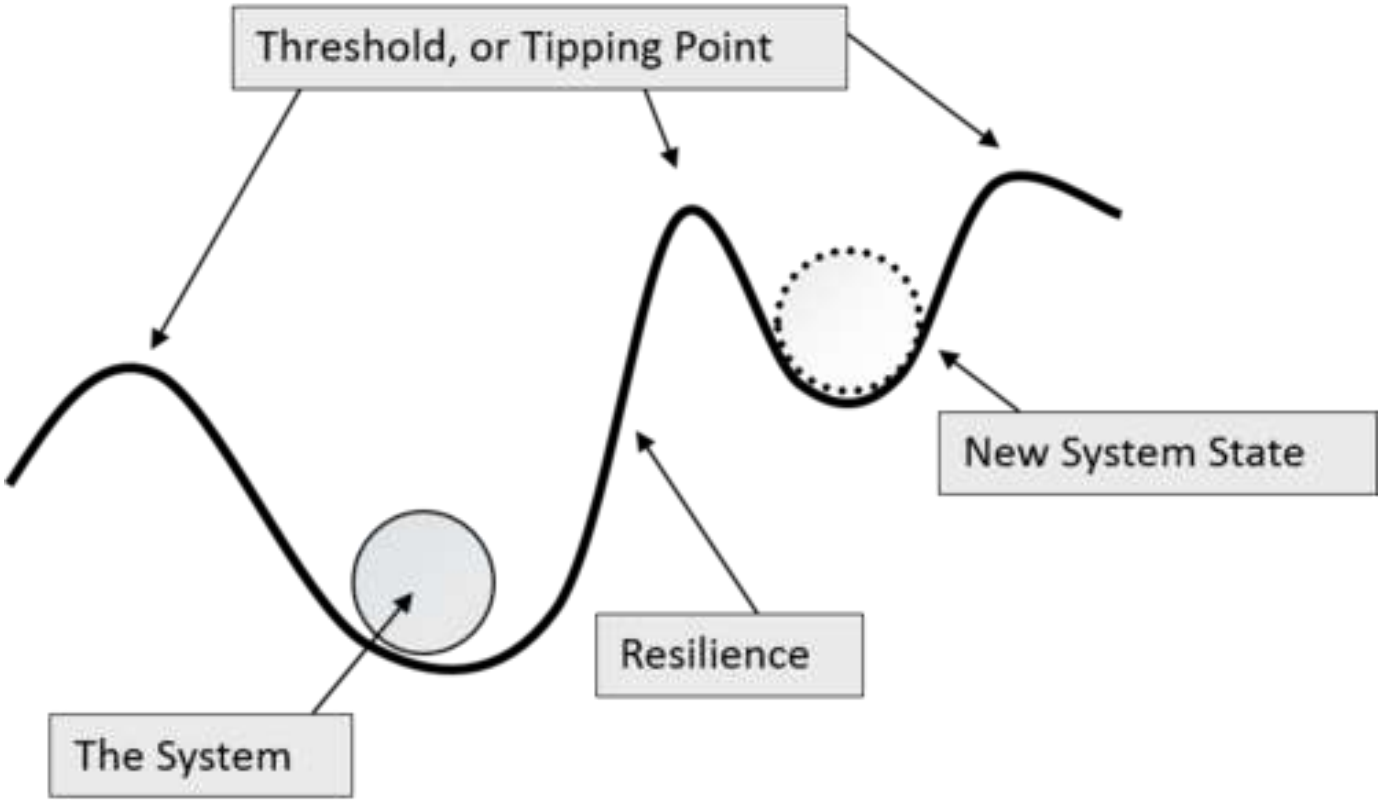
Three pillars of climate-smart agriculture (FAO)

Yield-smart
Market-smart
Community-smart

Water-smart
Knowledge-smart

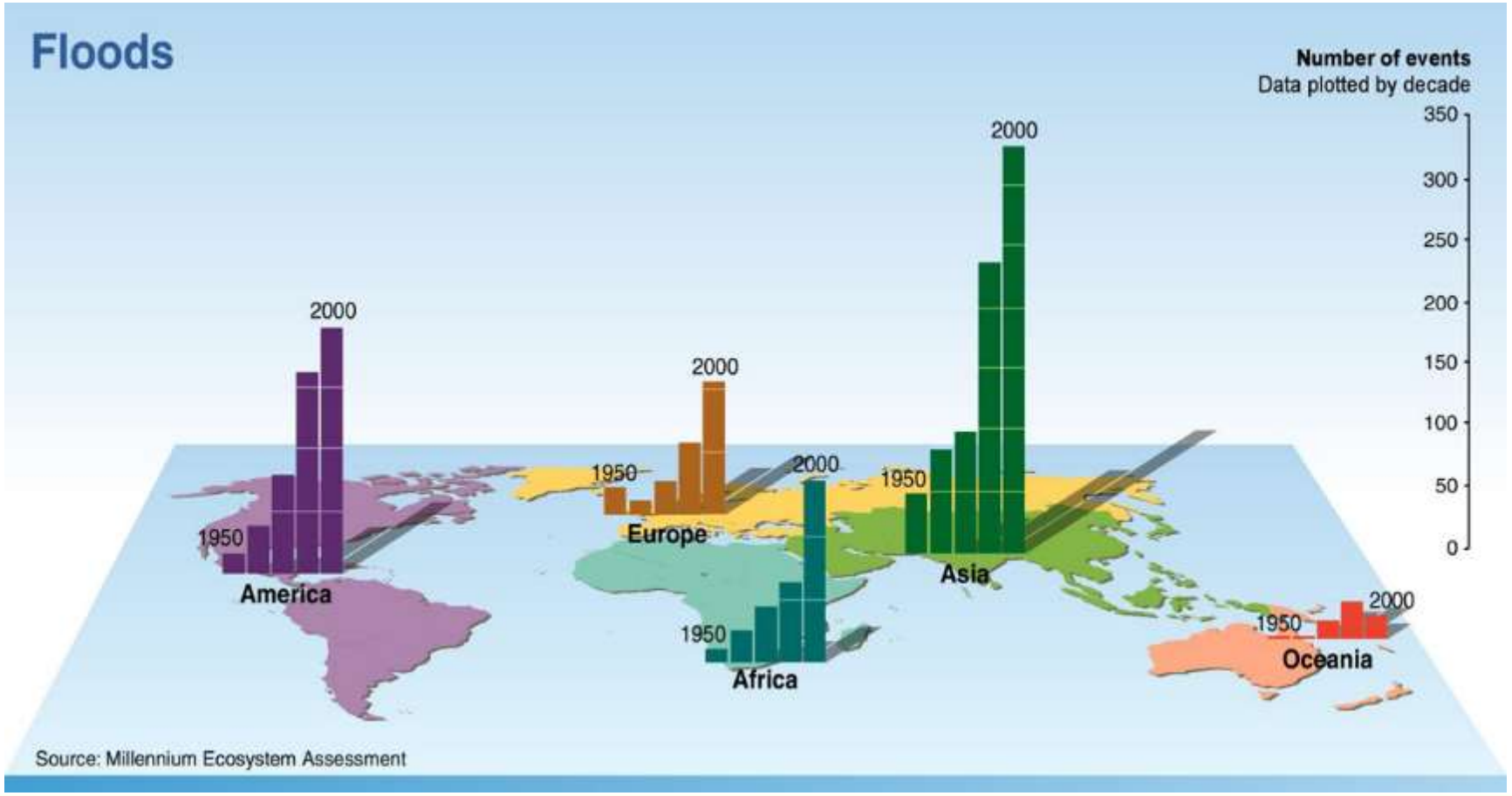
Carbon-smart
Energy-smart
Nitrogen-smart

Resilient = To bounce back



Source: http://www.conservationofchange.org/resilience/

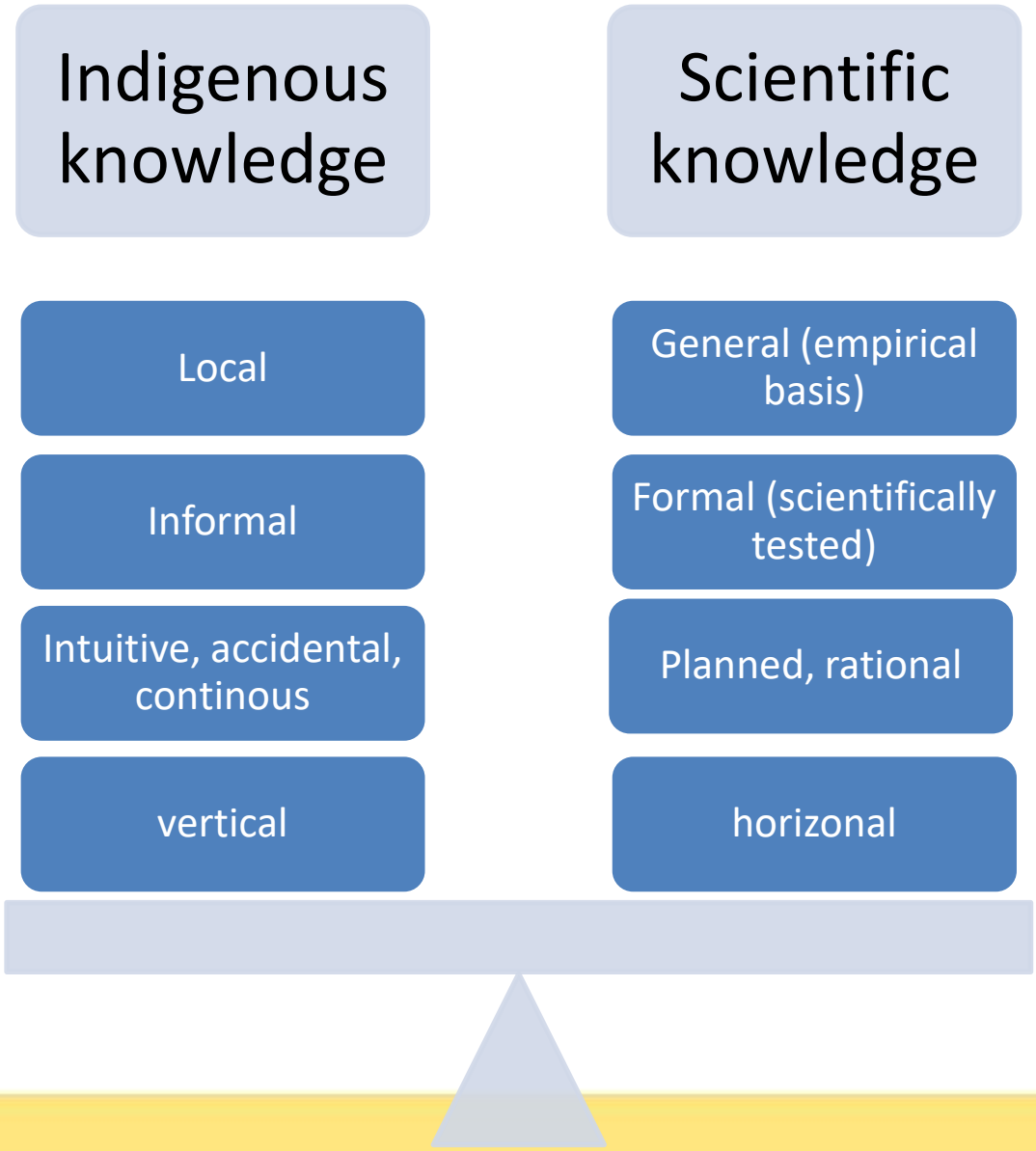
2. Sustainable Adaptation is ecosystem-based to increase capacity of ecosystems for natural hazard regulation.



3. Develop solutions with NOT for farmers

Picture source: Helvetas Kirgistan

4. Combine, disseminate & don‘t compare knowlegde

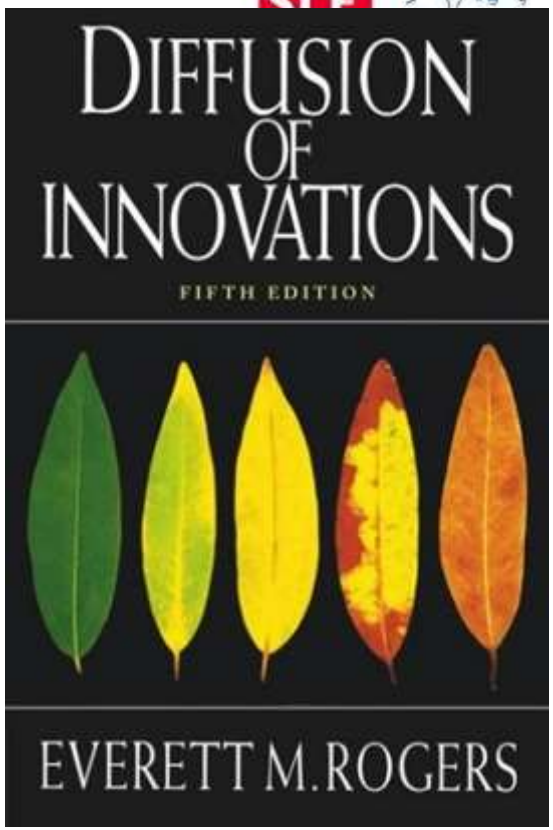


Innovation

"An innovation is an idea, practice or object that is perceived as new by an individual or other unit of adoption"

(Rogers 2003, p.12)

Everett M. Rogers *March 6, 1931 - October 21, 2004



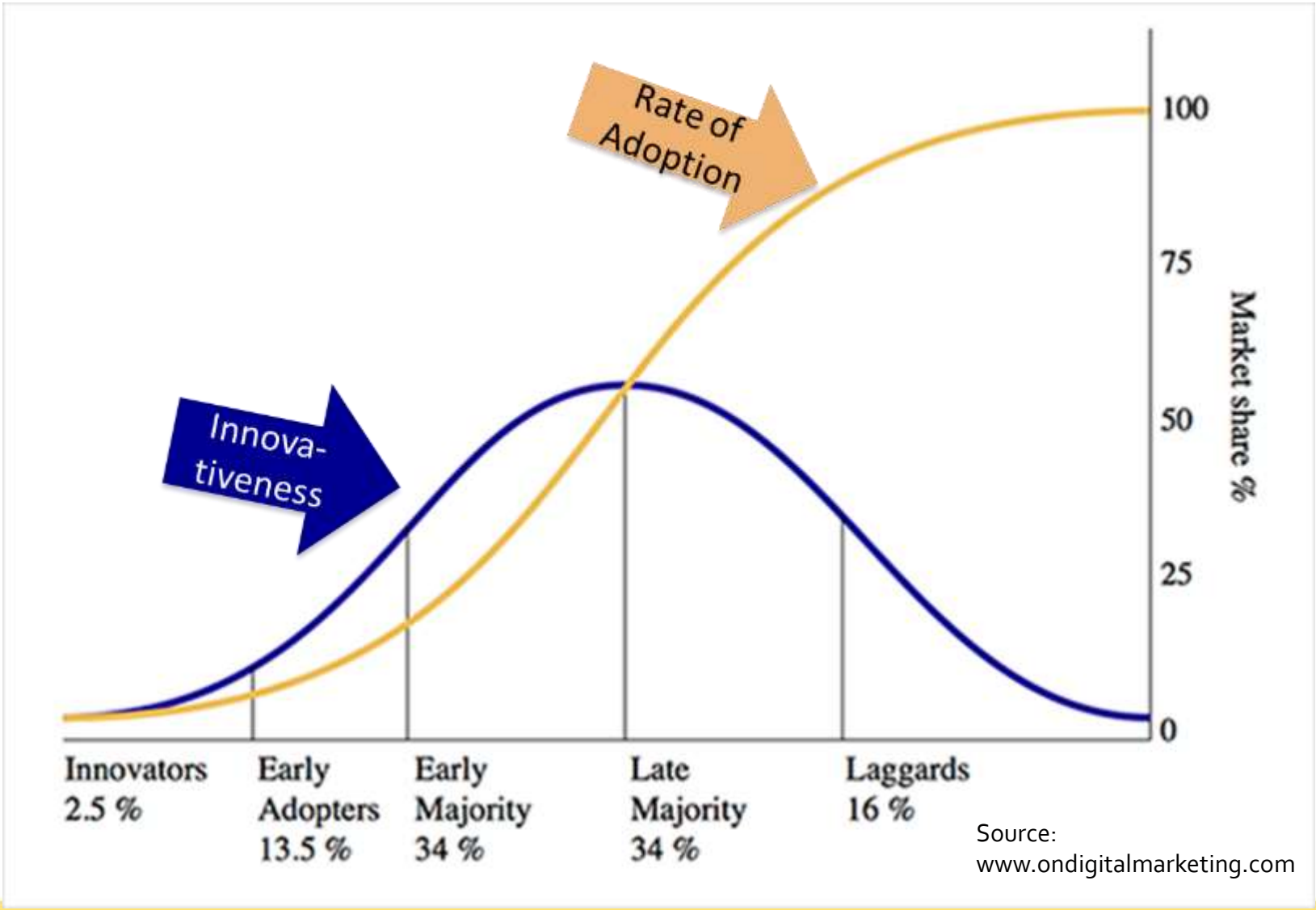
Technology, process or policy: i.e. hard- and software

4 Elements of diffusion theory

- Diffusion = a process, in which an innovation through communication via certain channels within a given time disseminates among the actors of a social system.

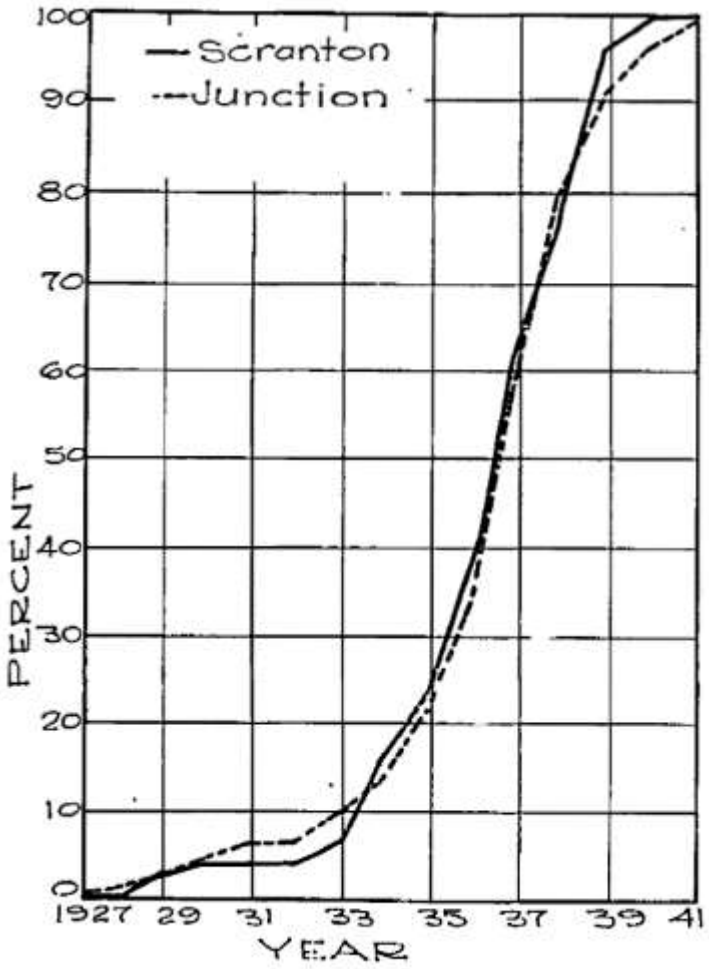
- 1. Innovation = new product, new behaviour, new process;
- 2. Communication channels = from mass media to personal communication (means)
- 3. Time = innovation decision making process from awareness, interest, evaluation, trial, adoption or awareness, persuasion, decision, implementation, conformation
- 4. Social system = norms and values, opinion leaders (who one is, what one knows, whom one knows)

Innovativeness (normal distribution) and Rate of Adoption (S curve)



Source: www.ondigitalmarketing.com

Dissemination of hybrid corn (Iowa study)



Source: Ryan and Gross (1950)

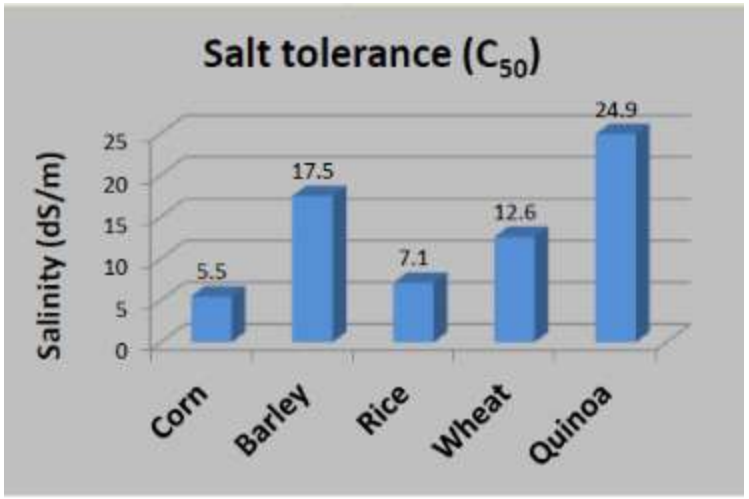
Factors that influence the adoption process

1. Characteristics of the innovation

Relative advantage	Are there any improvements of the innovation over the previous generation?
Compatibility	How consistent is the innovation with existing values, norms, and needs?
Complexity	How complicated or difficult to understand and use the innovation is perceived?
Trialability, **risk**	How easily an innovation may be tested? Can be tried on partial basis?
Observability	How visible is the innovation to others?

Quinoa (Chenopodium quinoa)

- Native to the Andes region, new to rest of the world
- Stress tolerant crop with extraordinary ability to adapt to different agro-ecological conditions
  - ✓ *From sea level to 4000 m altitude*
  - ✓ *Tolerates -1°C to +35°C temperatures*
  - ✓ *Facultative halophyte – some varieties cope with salinity as high as seawater (50 dS/m)*
  - ✓ *Drought resistant – grows with 200-400 mm rainfall*
- Highly nutritious – Seeds provides high-quality protein (10-18%) with all essential amino acids and minerals, also gluten free

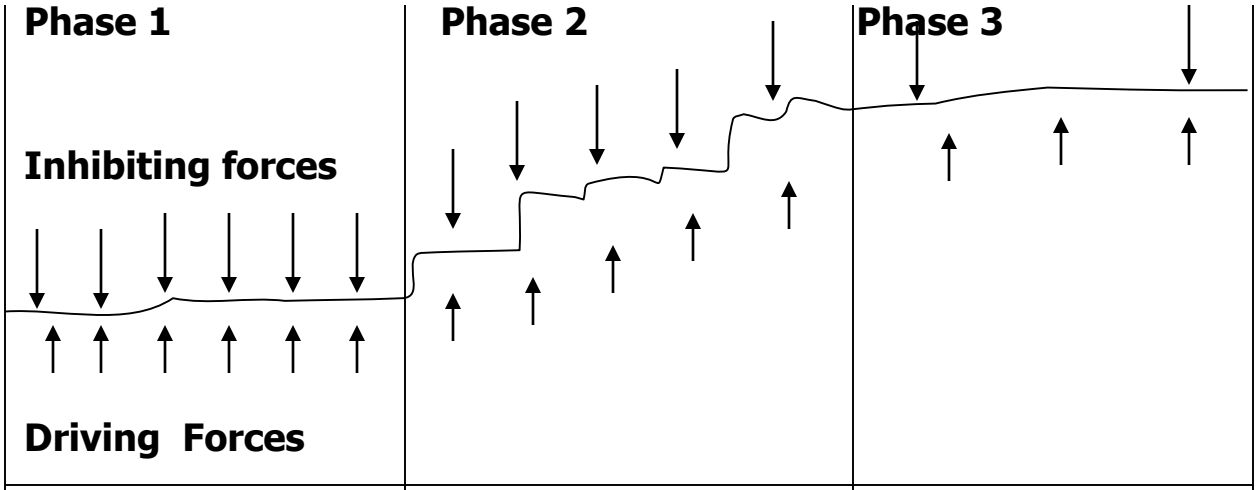


Source: Nanduri (2016)

Assessment of innovation to adapt to salinity

Characteristics	Quinoa	Saline-tolerant rice variety
Relative advantage	Marketable?	Lower yields compared to farmer variety
Compatibility	Low	High? Taste?
Complexibility	Medium,	low
Trialability	Yes, but seed suitable for low altitude and saline soils available?	Yes, seed available
Observability	visible	Not visible, needs signboard

3 Phase Model of behaviour modification



Disturbance of former equilibrium	Shift to new equilibrium	Stabilisation of modified behaviour
Perception of problem	Stages of implementation	Solution to problem or relapse

Quelle: Hofmann, V. (2009): 56

Practical examples

Underground low tech low cost micro-irrigation

Picture source: Lucas Zahl and CSHEP

Banana stem pot

Vertical gardening

Charcoal fridge –evaporative cooling in hot dry regions

Picture source: CSHEP Kiserian Kenya

Take home message

Climate-resilient innovations

1. Must be affordable and profitable
2. Pro-poor: also poor farmers can implement it
3. No regret measures (seed of early maturing varieties higher?)
4. Avoid maladaptation (e.g. more pests and diseases, more pesticides)
5. Advocacy: disseminate ideas and advocate for smallholder adaptation to speed up innovation power

End

Graphs

Picture E.M. Rogers: http://emrogersppmbfikom2013.blogspot.de/2013/08/tentang-everett-m-rogers.html
Picture Diffusion curve: www.ondigitalmarketing.com
Pictures from Laos: Silke Stöber ans LIWG
Pictures from Kenya: Esther Kagai, Lucas Zahl
Picture Farmer, Researcher: Agridea Kyrgyzstan
Picture diffusion corn Iowa: Ryan, B. and Gross, N. (1950): Acceptance and Diffusion of Hybrid Corn Seed in Two Iowa Communities, in: Agr. Research Bulletin, 372, pp.663-708.
Picture model of behaviour change: Hofmann, V et al. (2009): Handbook: Rural Extension Band 1 und 2
Picture SLE trainees: SLE

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