



Challenges of agroecology transition in irrigated perimeters

Prémila Masse

ALISEA -Online thematic session to share experience

CAMBODIA - 17th March 2022



Frame of the study

- ▶ Study requested by COSTEA (Scientific and Technical Committee for Agricultural Water)
 - ▶ to identify and qualify agroecology practices and innovation and conditions for successful agroecology transition in irrigated perimeter
 - ▶ implemented by a consortium of NGOs, researchers and universities
 - ▶ using methodology from *Memento for evaluation of Agroecology* by GTAE, completed with CIRAD to integrated specificity of irrigated system
 - ▶ Case study in 3 countries and 6 types of irrigated perimeters including 2 in Cambodia
- **Presentation and discussion of study's result done in Cambodia by Gret, CIRAD and NUBB**

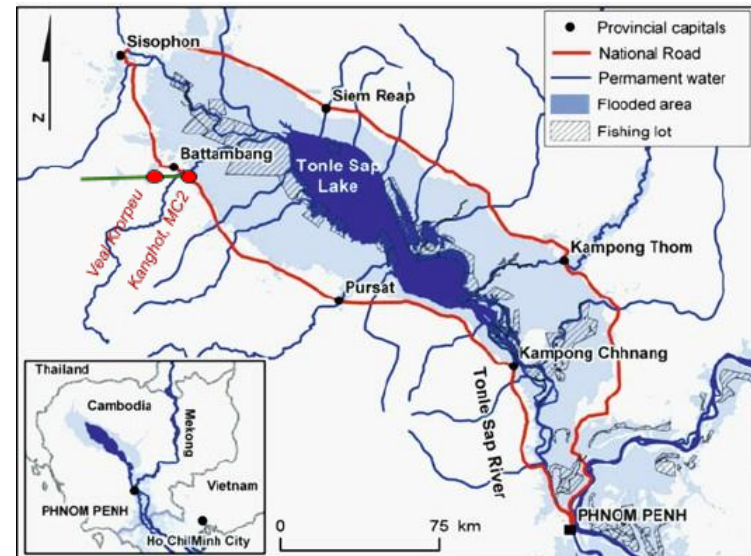
Methodology of the study

- ▶ Preliminary work : analysis of irrigated systems and specific challenges
- ▶ First phase : **inventory of agroecological practices**
- ▶ Second phase : **evaluation of agroecological practices** according to the Memento of AE evaluation methodology on the selected study sites, with the local partners.
- ▶ Last phase : create **spaces for consultation and dialogue** in the field and for valorization at the national level.



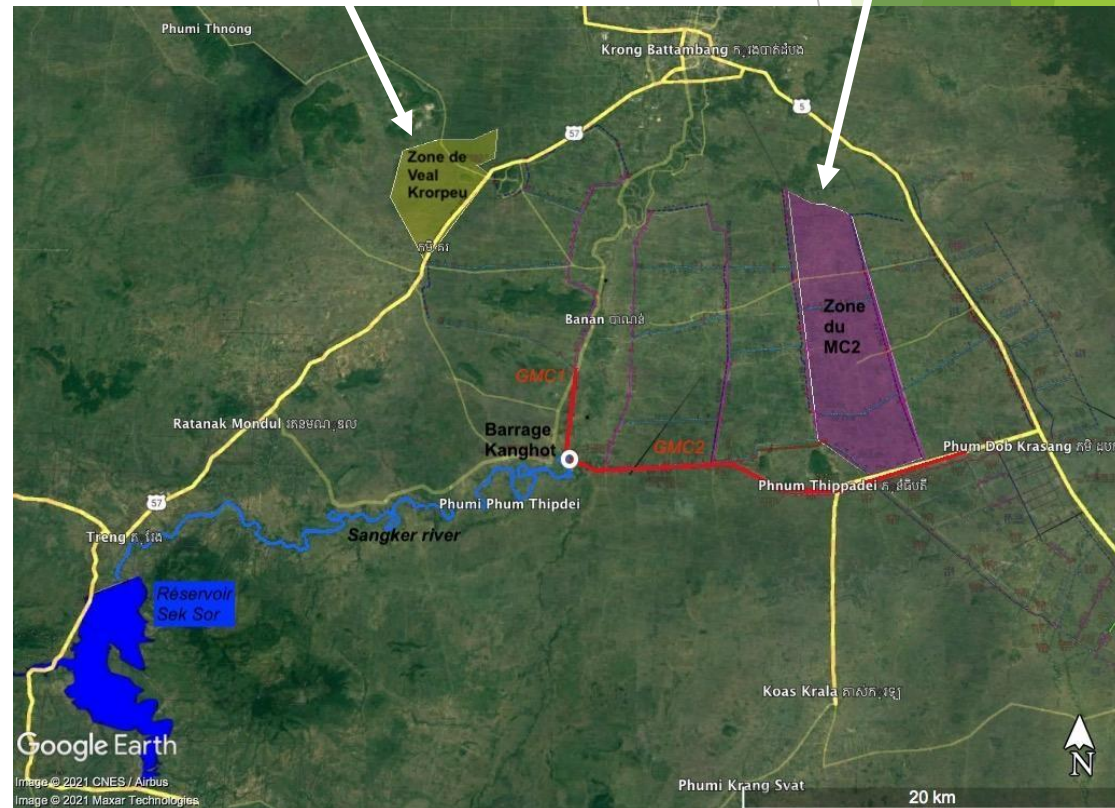
Cambodia study context : localization

► Kanghot irrigated perimeter in Battambang region



Veal krorpeu area
Limited access to
irrigation

Kanghot area
Irrigation by MC2
canal



Cambodia study context: constraints and challenges

- ▶ Area of historical rice intensification, supported by Green Revolution in 90's

- ▶ **Context's constraints**

 - Erratic water access and availability**

 - Large variability of water access within and among the blocks
 - Erratic rainfall pattern
 - Capacity of reservoir

 - Soil degradation**

 - Bare soils, unprotected soil surfaces in the dry season; high evaporation rate
 - Top soil compaction

 - Low diversification**

- Low crops diversification (mono cropping trend)
 - Low livestock integration (feed availability ,free roaming)
- Low food diversity

 - High costs** (services, fertilizers)

 - Environmental and human health issues** (Pesticide applications)

- **Main challenges for farmers of the area**

 - ✓ Have a decent income
 - ✓ Decrease vulnerability to price volatility
 - ✓ Decrease vulnerability to climate change
 - ✓ Sustainable production = maintain high yields without decreasing soil fertility



Cambodia study context : place of agroecology in the irrigated perimeter



Diversification through garden
(vegetable, fruit tree, fish farming) or
rotation/association



Soil fertility and structure improvement through cover crop,
land management, livestock-agriculture integration



Agroecology has potential to reduce farmers 'challenges

- **To secure and increase income :**
 - crop diversification (multiple source of income, all along the year)
 - Production with high value (higher income)
 - Low cost production (higher margin)
- **To value land without water**
- **To improve soil fertility**

Cambodia study context : place of agroecology in the irrigated perimeter

- Low level of “agroecologization” of the farms in Kanghot and Veal krorpeu

		agroécoloscore
KP6	TYPE 1B	21,5
DD13		21
KP21		12
DD11	TYPE 2A	8
WK20		4
WK5	TYPE 2B	12,5
OT10		7,5
KP23		5,5
DD18		9,5
KP22	TYPE 3A	11,5
DD16		11,5
WK19		9
WK1		6,5
WK2	TYPE 3B	14
KP7		16
KP8		13,5
DD12		15
DD14		18
DD15		23,5

Agroécoloscore		
T1	KT11	12.5
	KK6	18.5
	KT14	13
	KK16	15
	SA17	11
T2	KT4	16
	KT8	20
	KK22	23
T3	SA20	13
	KK1	21.5
	KK5	17
	SA19	22
	KC21	16.5
T4a	KS15	19
	KT9	22
	KT18	16.5
	KK12	19.5
T4b	KK10	17.5
	KC7	20
	KK2	25
	KK13	20.5

E	0 à 10
D	11 à 21
D+	11 à 15
D-	15 à 21
C	22 à 32
B	33 à 43
A	44 à 54

Non agro ecological farming system



Highly agro ecological farming system

WHY ?

Agro-environmental evaluation : positive impact of AE practices at plot level

- ▶ **Impact of land management on soil quality** : Comparison between Green Manure (GM) / Conventional Tillage in Kanghot, and conservation agriculture (CA) in Veal Krorpeu
 - **soil structure**
 - “softer and easier to plough, keep the soil moisture” according to farmers
 - Larger soil aggregate (CA/GM), no difference in water infiltration rate
 - Better connectivity between soil layers (CA)
 - **soil biological activity (dry season):**
 - “higher density of earthworms”
 - increase of the abundance of the macro and mesofauna +24% (GM) and of mesofauna (CA)
 -

Agro-environmental evaluation : positive impact of AE practices at plot level

- nutrient management

some farmers decreased chemical fertilizer by 100kg/ha per cycle, “improved soil fertility”

Trend of lower NO₃ and higher NH₄ (GM) / Higher available N and NH₄ and better balance of NO₃/NH₄ (CA)

Lower labile Carbon (GM)

Higher Ca, Mg and K contents in the 0 to 40-cm soil layer(Sar et al., 2020) (CA,GM)

- weeds management

“less weeds, less use of herbicide”

low level of weeds in first cycle (GM) but still issue for CA

- Pest and diseases management

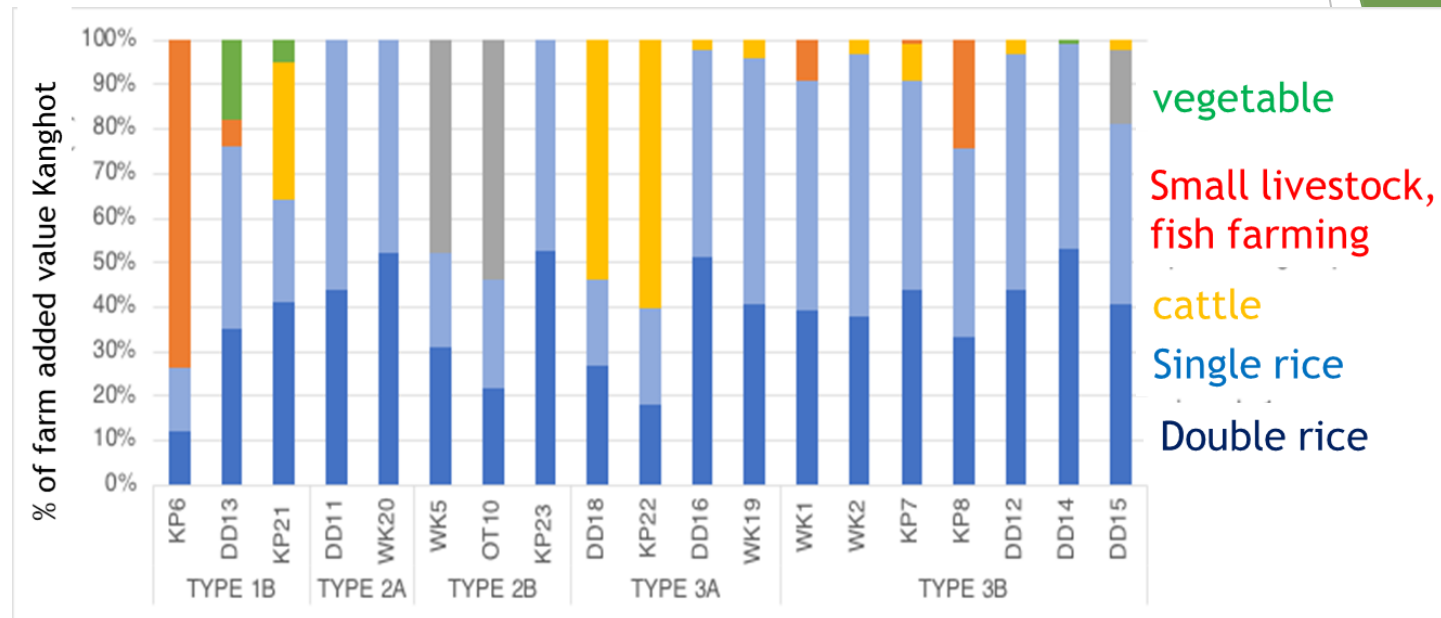
Less loss due to stem borers (GM) in Kanghot, to panicle blast in VK



Socio economical evaluation : farming system limits

Farm system is lock down by rice in low land (double cropping)

- **Gross added value of the farm** : predominance of rice (double and single)



- **Gross added value per worker** of double rice (67 USD/working day) > fish farming (49 USD/wd) > single rice (27 USD/wd) >cattle(7 USD/wd)
- No time for alternative crops, no labour for alternative production

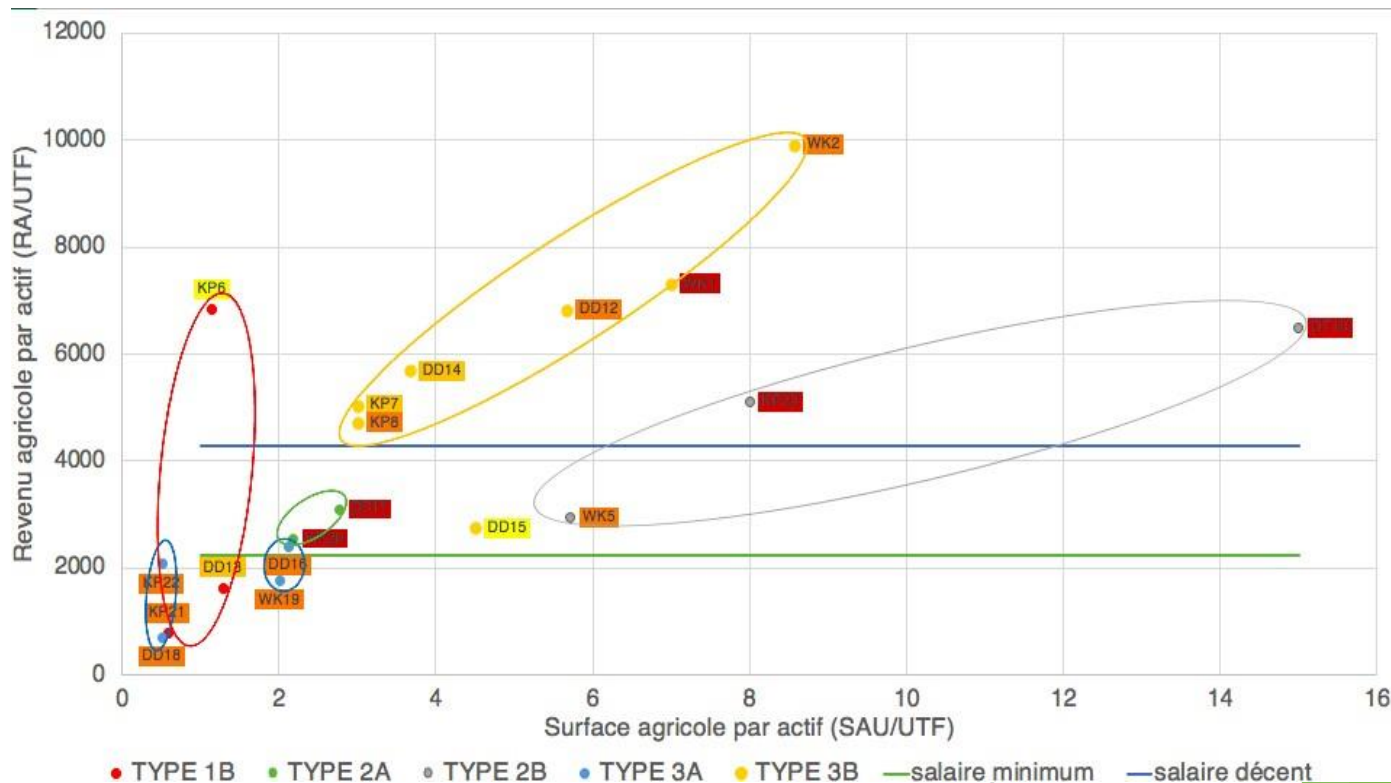
BUT **Gross added value per surface** of fish farming (71 021 USD/ha) >>> double rice (1670 usd/ha) but request huge labour

under 2T/ha rice production is not profitable while yield uncertainty increase with change of climatic patterns

Socio economical evaluation: farming system limits

Farms lack of resources to invest of develop AE practices

- lack of **technical skills** for innovative practices (cover crops, fish farming...)
- limited **access to land** (uplands and garden mainly in Veal Krorpeu)
- agri income are insufficient to cover family needs → massive off farm job
- **low availability of labor and investment capacities**



decent wage

Minimum wage

Others factors of development/blockage of agroecology

- ▶ **Farming system type** determine choice of copying strategy and adoption potential of AE practices. 3 farmers strategies were identified to cope with agriculture challenges, with short term economic profit as main driver :
 - looking for more autonomy
 - limit vulnerability
 - capitalization of the farm taking risk and trying innovations.

Most vulnerable types don't have enough ressource (capital, labor) to invest in AE while wealthier types have the capacities to take the risk but are not necessarily interested in AE transition (rice focus)

- ▶ **Market environnement** is not favorable to AE transition : high focus on rice (with low diversity of demand and no support to others productions even when there is high market variation (ex sesame).

Others factors of development/blockage of agroecology

- ▶ **Collective Initiatives** (cooperative, water management) are not well structured and developed, with low level of participation by farmers so there is lack of knowledge and innovation dissemination and of value chain opportunities development
- ▶ **Extension services** are globally weak and doesn't integrate AE approach
- ▶ **Agricultural policies** currently don't really help with AE development.

The background features abstract, overlapping green geometric shapes, primarily triangles and polygons, in various shades of green, creating a modern and dynamic design.

Thank you