TC-341S

Indicators of Water User Association for Sustainability Transition:

A Preliminary Model[11]

Jitraporn Somyanontanakul
College of Politics and Governance, Mahasarakham Universityjitraporn.s@msu.ac.th

Surangrut Jumnianpol, Ph.D.
Chulalongkorn University Social Research Institutesurangrut.j@chula.ac.th

Sirinon Suwanmolee, Ph.D.
Department of Environmental Engineering and Disaster Management,
Mahidol University, Kanjanaburi Campussirinon.suw@mahidol.ac.th

Abstract
In this paper, the researchers review criteria and indicators of water user associations to provide a preliminary model of water users who can manage water following the concept of sustainability transitions. The definitions of Water User Association (WUA) and the concept of sustainability transitions are starting points to design the desirable characteristics of WUA. Methods used in the paper are documentary research and in-depth interviews with key informants from twelve case studies. The paper will then propose indicators for assessing a water user group's organization and performance with relation to water management. The authors expect that, apart from identifying shortcomings of a water user group in question, we will also specify capacity-building needed to uplift the water user group's performance. Therefore, the indicators would increase the water user group's capacity for managing water in sustainable ways.

***Keywords*--** Water User Association, Indicator, Sustainability Transition

I. Introduction

From the Water Resources Act, B.E. 2018[2] and the Ministry of Water User Organization Rules B.E. 2021, water user organizations become one of the key mechanisms for improving water management. The movement in Thailand is in line with the development of water management at the international levels which all strive to create measures, criteria, and mechanisms of water governance to create the transition towards sustainability. However, when considering the details of water user organizations in Thailand, there is a lot of missing detail, particularly, the detail about the characteristics and elements of water user organizations which will create the potential for the water users to take part in sustainable water management. That is, they can play a critical role in creating water management that is consistent with the ecological and eco-cultural characteristics of each area and/or watershed. In fact, people basically form a group to manage water at different levels before the Water Resources Act. There were five types of water user groups in managing water for the irrigation project (19). For example, *the Muang Fai* group is the traditional water user group managed in the Northern region of Thailand.
In this paper, we define a Water User Association (WUA) or a water group as the grassroots player engaging in water management. The paper seeks to assess the active Water User Association or an active water user group with its aims to enhance the capacity of local water communities to be able to manage water sustainably in relation to ecological and eco-cultural diversity. Therefore, our key assumption is that the success of WUA in water management sustainability

[1] This paper is the part of the ongoing research project entitled 'Capacity Building for Sustainable Water Management at Local Level: A Case Study of Participatory Assessment of Community Water Management' funded by the Water Management Program, under the Social Spearhead of National Research Council Office,2021

[2] The Ministerial Regulation under National Water Resource Act B.E.2018 authorized WUAs as local agenciesfunctioning in protection the member benefit, recommendation to Water Basin Committee about water management in the area including the nomination of the representative to be the Water Basin Committee.

consists of 3 'Es': Efficiency, Equity, and Environmental consideration. The concept of Water Governance and Sustainability Transitions are used to outline the indicators. The authors also reviewed other international concepts of water management such as IWRM, as well as international and national practices and experience to create the preliminary version of the indicators. There are four parts to the paper. After this introduction, the second part is the conceptual framework constructed from water governance and sustainable transition. The third part will show the preliminary version of our indicators. We will conclude the paper with our observations.

II. Conceptual Framework: *Defining Sustainability Transition for Water Management*

The Dublin Principles states that water is an economic resource (as an economic good). This concept then become the basis for developing Integrated Water Resources Management (IWRM) principles. These principles focus efficiency and effectiveness of water management on increasing productivity in the agricultural system. However, many scholars criticize the IWRM, especially for its neglect of social and cultural characteristics and a political process of water resource allocation. The water community, which is those involved in the development of water management, began to see that water management cannot be a ready-made tool to bring sustainability to water management. It was also noted that the way of thinking or understanding of water-related matters is complex, and many socio-cultural and political factors influence the success of the process (6)(9).

This requires a comprehensive analysis framework flexible with more aspects of human well-being (1)(4)(7)(13).

With regards to the term Sustainability Transitions, it means the process of structural transformation in the (sub)systems of society (5) (15). The sustainability transitions occur when the dominant structure in society is pressured by external changes and innovations occurring within the society (11). For sustainability transitions, three factors are necessary: the emergence of system innovation, the emergence of social technology, socio-technical transitions, and the emergence of sustainable technologies (12).

Hence when thinking about how to shift unsustainable water management into a more sustainable way, we propose to look at the community/local level. As in the sustainability transitions, creating and developing water management innovations at these levels is the key to sustainability. It also encourages multi-level stakeholders to engage in a water policy process with its aims to create effective, equitable, and sustainable water management at different levels.

III. Outlining the Indicator

From the two concepts, we define a WUA for sustainability transitions as an organization to manage water effectively within the community/local area. It also must promote and develop a water management process in which local people can engage in the organization and the policy process, horizontally (between water user organizations) and vertically (at a higher level, such as the Watershed Committee). Then, it is our ambition to cover water user groups or organizations both inside and outside the irrigation areas under the '3Es' principles: Efficiency, Equity, and Environmental considerations. In this respect, water user organizations/ water groups are also involved in creating local action. It is also based on the idea that such management will increase equity, effectiveness, and sustainability (14). This concept is in line with the World Bank's focus on promoting local participation as a critical engine or intermediary in creating sustainable livelihoods, promoting good governance, and alleviating poverty. Initially, the authors broadly classify the indicators as the performance of the water user associations (WUA) on sustainability transitions into three stages under a policy process in each stage; it composed of the indicators as follows

1) Input section. Indicators include the nature and structure of the water user organization, including a sub-metric about the number and proportion of members of a group; past group/organization action plans, rules, and regulations; community data preparation and infrastructure.

2) Process section. Indicators include the operational processes of the water user organization; the level of participation; usage of diverse knowledge/technology and innovation; self-monitoring and assessment process; use of information and sharing of information between members and network partners.

3) Output/Outcome section. Indicators include the achievement of efficient use of water; capacity building and sharing between network partners

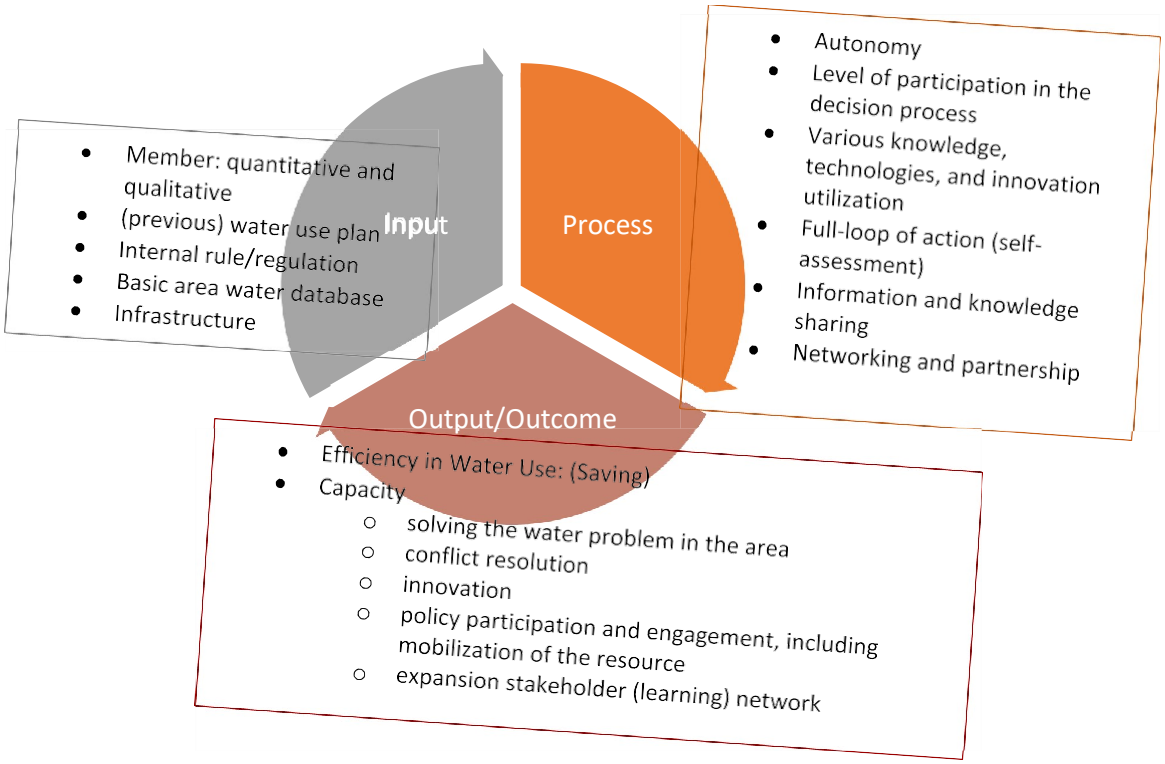

Figure 1: Outline of the indicators

We give 1, 2, or 3 for each indicator: 1 is the lowest point and 3 is the highest point. Then, we will calculate the overall performance of a water group.

Table 1: Preliminary Indicators for WUA for Sustainability Transition

Indicator	Indicator Name	Description	Level
Input			
Member			
	1. Number of members	The Water Act indicated that at least 30 members formed to be a water user association	1- minimum 30 members
			2- 31-50 members
			3- 51 members above
	2. Proportion of marginalized member	the inclusion of the marginalized group as to guarantee the equality of water management	1- none
			2- few marginalized members
			3- 1/3 of members are marginalized
	3. Proportion of members in a management position	The marginalized group included in the management position, e.g., female, the poor,	1-restrict to a traditional power/elite group, e.g., sub-district/village chief, local politicians

		younger generation	2- the traditional group of the elite plus with at least one of the marginalized
			3- inclusive group
	4. informed member	informed member considering their related knowledge and access to the knowledge	1-lack of knowledge and inability to access the knowledge
			2- have some basic knowledge but still lacking access to more knowledge
			3- have some basic knowledge and ability to access more knowledge

Indicator	**Indicator Name**	**Description**	**Level**
(previous) plan	5. water use plan	the water user groups write their plan and present it to the local governments or relevant authorities	1-no water use plan
			2- have an earlier plan but not up to date
			3- have an up-to-date plan
	6. Infrastructure plan	including the maintenance and rebuilding plan; logistic (dredging) organizational plan; and capacity development	1-no plan
			2- have an earlier plan but not up to date
			3- have an up-to-date plan
Rule and Regulation	7. (internal) rule and regulation	adaptable to integrate themselves into the shared values or common laws (16)	1- no draft or agreement of water usage among the member
			2- using the traditional (or customary) rule/regulations as an agreement among member
			3- integrating traditional (customary) regulation with the rule of the Royal Irrigation Department or other modern/ official regulations
Data and Information	8. Water supply database	The data was ready to use for water management, i.e., surface water, groundwater, underground water	1-none
			2-had old data (but not updated)
			3-having and always updated
	9. water balance database	Loss is calculated (water discharged from the system without being used). There is also agriculture that uses much water. A lemon orchard pumps water up to collect and then releases it like a village	1-no database
			2- have an earlier database but not up to date

		water supply (2). Kamphangphet has other areas that are not in the irrigation system. It uses themethod of drilling shallow wells. which also absorbs into the water system	3- have an up-to-date database
	10. water (route) map	GIS Spatial data or handwriting plot of water-map/water diagram	1-no map
			2- have an earlier map but not up to date
			3- have an up-to-date map
	11. cultivation map	The data displays what each family grows and the size of the plantation from the agricultural council, from thesubdistrict administrative organization	1-no map
			2- have an earlier map but not up to date
			3- have an up-to-date map
	12. calculation of waterfor cultivation	using the data from the crop map to calculate, including the handwriting data. Also, developing applications of the information system at the community level which	1-no data
			2- have earlier data but not up to date
			3- have an up-to-date data

Indicator	**Indicator Name**	**Description**	**Level**
		government agencies accept	
Infrastructure	13. well and enough infrastructure	Although the water user groups could not build their infrastructure, some may be responsible for infrastructure maintenance.	1- none or not distributed thoroughly
			2- have the infrastructure but not distributed thoroughly and not well maintenance
			3- have the infrastructure distributedthoroughly with regular maintenance
	14. sense of ownership	a sense of ownership	1- no sense of ownership
			2- some sense of ownership
			3- a full sense of ownership
Process			
Level of Participation in operation	1. Autonomy	degree of self-determinationand freedom	1- strictly follow the government orders
			2- be able to negotiate with the government agency and other organizations at some points/ degree
			3- fully engaging in a policy-making process and a decision-making process
	2. chairman/ group	the process for leader	1- being designed by the government agency

	leader selection	selection could identify thelevel and quality of participation in the group	2- Voting only
			3- full deliberation with voting
	3. decision-making process in the preparation of water useplan	levels of the participatory process.	1- no joint decision; follow the predetermined plan which is instructed by the authorities.
			2- collective decision-making effort
			3- full consultation and mutual decision-making in a policy process
Various knowledge, technologies, and innovation use	4. use of knowledge and database	It includes both modern andindigenous knowledge and database	1- none or but has never been used
			2- co-exist but not up-to-date or usedbut not very applicable.
			3- co-exist and applicable
	5. use of technology in water assessment and decision-making process	Indigenous technology such asthe construction of a sluice gate, Water diversion area, water retention, and digging the well by themselves (8)	1- no technology used
			2- have the technology, information technology, hydraulics used at some level
			3- have fully used the technology, information, hydraulics in thedecision-making process.
	6. use ofeconomic tools	Water fee is a kind of tool to raise the sense of ownership and responsibility (18).	1- no water fee
			2- collect water fee, but not a clear implementation plan
			3- collect water usage fees with a clear plan for maintenance and operation management of the irrigation system

Indicator	Indicator Name	Description	Level
A full loop of action	7. follow-up and self-assessment process	metrics for success have beenset, i.e., there is a significant increase in water efficiency	1- no follow-up plan
			2- have a follow-up evaluation but unplan
			3- planned and up to date monitoring and evaluation
Information and knowledge sharing among member	8. disclosure of information	transparency of the workinggroup	1-never disclosed or exchanged information
			2 disclosed but exchanged information only with some leaders or certain groups
			3- disclosed and exchanged information to different groups
	9. knowledge management with vulnerable members	knowledge improvement activities and public relations with vulnerable	1- no activities with vulnerable groups
			2- have activities with vulnerable groups from time to time

		members	3- have scheduled/ planned activities withvulnerable groups
	10. network and partnership	networking and partnership with other organizations, suchas the Royal Government Irrigation Office (10)	1- no relationship
			2- create a formal and vertical relationship with the authorities
			3- create a network/partnerwith multi-level sectors horizontally and vertically
Output/Outcome			
Effectiveness	1. water-saving and effective water use	Change plants that use less water or plant high-value crops with using the same amount of water	1- No measurement and improvement of water use
			2- measure water use but not regular and inconsistent with water usage improvement
			3- measure and improve water use regularly
Capacity	2. Solving problems at the community level	awareness and initiative to solve the community problem	1- no attempt to solve any problems
			2- address problems and ask others to solve problems
			3- manage problems themselves
	3. conflict resolution	fair water distribution from Upstream to Downstream, and the conflict resolution organ could become a Joint Management Committee forIrrigation-JMC	1- no mechanism for resolving disputes between areas/groups
			2-have a mechanism established and conflict mediatorsidentified clearly but not functioning
			3- have a mechanism established, conflict mediatorsidentified clearly, and have ability to settle conflicts

Indicator	Indicator Name	Description	Level
	4. creating community innovations and transferring to other groups	Create and share knowledge of watergate, ladder rice field, irrigation liner, any technique as lessons to other groups	1- None
			2- existing, but with limited/specific groups/ areas
			3- existing, and applicable to multi-level and multi-scale groups
	5. participation in policydecisions at the local level	willingness of the WUA and the acceptance of local authority for participating inpolicy decision making	1- not participate in the decision-making process
			2- occasionally participate in the decision-making process
			3- regularly participate in the decision-making process

	6. participation in policydecisions at a higher level	the willingness of the WUA and the acceptance of higherauthority for participating in policy decision making, e.g., the basin committee	1- not participate in the decision-making process
			2- occasionally participate inthe decision-making process
			3- regularly participate in the decision-making process
	7. policy engagement	water user groups' voice and requirements can approach the policy advocacies	1- None
			2- the local authority accepted and implemented the proposalat the local level
			3- higher-level authorities accepted and implemented the proposal
Partnership	8. sharing information/knowledge amongpartners	partnership and sharing the information/knowledge is theway for strengthening its capacity	1- no network
			2- share information/knowledge but with a limited network and areas
			3- share information/knowledge with broader network cross-sectors/areas

IV. Observation and Conclusion

Designing indicators for WUA is not new; there are attempts to develop many times and, in many countries[3]. Yet, the authors still seek for developing these indicators with our ambition to create indicators by applying a sustainable development approach consistent with the Thailand context. In this light, WUA is a local change agent for sustainability transitions.

In this paper, the authors review criteria, and indicators of water user associations to provide a preliminary model of water users who can manage water following the concept of sustainability transitions. The definitions of Water User Association (WUA) and the concept of sustainability transitions are starting points to design the desirable characteristics of WUA. The paper will then propose indicators for assessing a water user group's organization and performance with relation to water management.

However, we realize that outlining the indicators in the ivory tower has its limitations. The substance of the Thai Water Resource Act is also different from other countries, especially in the sense that water resource in Thailand is state ownership. Hence, stakeholders' first-hand experience is a must for us to look for both best and worst practices before revising our indicators. We expect that in the end, our indicators could identify the shortcomings ofa water user group in question and uplift the capacity needed for advancing the performance of the water user group. Finally, they can increase the water user group's capacity for managing water in sustainable ways.

Reference

(1) Akamani, K. (2016). Adaptive water governance: Integrating the human dimensions into water resource governance. Journal of Contemporary Water Research & Education, 158(1), 2–18.

(2) Benedikter, S., Waibel, G. (2013). The formation of water user groups in a nexus of central directives and local administration in the Mekong Delta, Vietnam. ZEF Working Paper Series

[3] For example, Wang et al. developed the indicator to assess WUA in China in terms of economic performance (Wang,Huang, Haung, & Rozelle, 2016)

No. 112, May 2013.
(3) Duhari, M. A. (2020). Irrigation management and Irrigation management transfer policy: Lessons from Mexico, Philipines, and Indonesia. In Paper Knowledge. Toward a Media History of Documents. Institute of Technology Bandung.
(4) Floress, K., Akamani, K., Halvorsen, K. E., Kozich, A. T., & Davenport, M. (2015). The role of social science in successfully implementing watershed management strategies. Journal of Contemporary Water Research & Education, 154(1), 85–105.
(5) Geels, F. W. (2002). Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study. Research Policy, 31(8-9), 1257-1274.
(6) Ghosh, S., Kumar, A., Nanda, P., & Anand, P. S. B. (2010). Group dynamics effectiveness of water user associations under different irrigation systems in an eastern Indian state. Irrigation and Drainage, 59(5), 559–574.
(7) Huitema, D., Mostert, E., Egas, W., Moellenkamp, S., Pahl-Wostl, C., & Yalcin, R. (2009). Adaptive water governance: Assessing the institutional prescriptions of adaptive (co-) management from a governance perspective and defining a research agenda. Ecology and Society, 14(1).
(8) Kanda, S., Naret, H., Dacumos, R., Furuzono, K., Satoh, A., Nda, T. C., Ueno, J., Prak, S. da, & Seakchhy, M. (2015). Participatory Irrigation Management in Cambodia: The Case of a Farmer Water User Community in Kampong Speu Province.
(9) Kumar, S. (2015). Water Resource Management through Collective Action: A Study in the Context of Water User Group Among the Tribes of Eastern India.
(10) Ky, S. (2015). Challenges of Farmer Water User Communities in Participatory Irrigation Management and Development in Pursat Province, Cambodia. 43.
(11) Loorbach, D. (2010). Transition management for sustainable development: A prescriptive, complexity-based governance framework. Governance, 23(1), 161–183.
(12) Markard, J., Raven, R., & Truffer, B. (2012). Sustainability transitions: An emerging field ofresearch and its prospects. Research Policy, 41(6), 955–967.
(13) Pahl-Wostl, C., Lebel, L., Knieper, C., & Nikitina, E. (2012). From applying panaceas to mastering complexity: Toward adaptive water governance in river basins. Environmental Science & Policy, 23, 24–34.
(14) Rola, A. C., Pulhin, J. M., Tabios, G. Q., Lizada, J. C., & Dayo, M. H. (2015). Challenges of water governance in the Philippines. Philippine J. Sci, 144(2), 197-208.
(15) Rotmans, J., van Asselt, M., Anastasi, C., Greeuw, S., Mellors, J., Peters, S., ... & Rijkens, N. (2000). Visions for a sustainable Europe. Futures, 32(9-10), 809-831.
(16) Roth, D. (2011). The Subak in Diaspora: Balinese Farmers and the Subak in South Sulawesi. Human Ecology, 39(1), 55–68. https://doi.org/10.1007/s10745-010-9374-7
(17) Banjongsiri Sajja. (2018). Guidelines for participatory water resource management of the people's sector: a case study of the Nan River Basin. Sukhothai Thammathirat Open University: Nonthaburi.
(18) Takahashi, S. (2017). Report Viet Nam: Central Region Water Resources Project Independent Evaluation. December.
(19) Thepkhachon, P. (2008). Law Supporting for the Establishment of Water-users' Groups in the Irrigation Areas. M.A. Thesis, Chulalongkorn University, Faculty of Law.
(20) Wang, J., Huang, Q., Haung, J., & Rozelle, S. (2016). Evaluation of Water User Associations. In J. Wang, Q. Huang, J. Huang, & S. Rozelle (Eds.), Managing Water on China's Farms (pp. 193-214). Academic Press. doi:10.1016/B978-0-12-805164-1.01001-0