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An Application of "Governing the Commons"
on Irrigation Institutions in Thailand

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This paper aims to apply Ostrom's model of self-organizing entities to govern common pool resources (CPR) on the irrigation institutions in Thailand. This application is an academic exercise that would help me to understand Ostrom's Governing the Commons. Information regarding Thailand in all respects, e.g. water users groups, Thai society and culture, policy trend of the Royal Irrigation Department (RID), etc. is purely based on personal experience, thus limited precision will be anticipated. Ostrom's focus on the bottom-up approach (i.e. even the institutional changes should be proposed by irrigation communities and not the central government) is acknowledged. But since I am not a member of such communities, my perspective will mainly be from the side of a bureaucrat who wants to see changes. Since I have never spent adequate portion of time with any single irrigation association, this paper will rely on a very generally perceived features of irrigation associations that I extensively visited as part of my official duties. This preliminary brainstorm would pave a way for a more systematic study based on specific water associations that would reveal more particulars and variables of the complex world.

Ostrom's challenge to superimpose her model on real life situation seems to be relevant to the situations in Thailand where the process for structural readjustment has been called for in order to redistribute wealth. In the irrigation sector, questions as to how to wean irrigators from decades-long subsidy and how to untie political clout that perpetuates the inequitable wealth distribution need to be answered so that the country development is better balanced and more stabilized. As with many other consultants, I see potential of such results in Ostrom's model but I still do not have confidence on its practicability. A thorough and setting-specific study has to be conducted before jumping into a conclusion that her model is a cure-all.

Since Ostrom has limited her thesis on variable identification, the previously proposed paper outline has been changed. She has strategically adopted more of a descriptive approach and has not distinctly prescribed any policy prescription on the **institutional transformation process. Instead, this paper will try to describe particulars of some variables in her model based on an assumption that RID** has a desire to give irrigation associations a complete control of their irrigation management. Such particulars would add more subtle dimensions to the variables and would help me in identifying representative locations of my future systematic study. Hypothetical conclusions and critiques on Ostrom's model will also be given.

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Summary of Ostrom's Ideas

Ostrom postulated that, apart from privatization imposed or direct control by external authorities, letting users of or people impacted by uses of common pool resources to organize themselves and govern the commons would be a more effective and sustainable resources management. Based on her analyses of some selected long-endured institutions, she proposed the principles of robust self-organizing CPR institutions as follows:

1. CPR institutions must have a clearly defined CPR and users boundary.
2. CPR institutions must have appropriation and provision rules that are congruent with local conditions.
3. Most members of CPR institutions must have an access to modify the rules.
4. Monitors of CPR institutions must be accountable to the CPR institution members, if not the members themselves.
5. CPR rules must include penalty code graduated according to the seriousness and context of violation.
6. CPR institutions must have low-cost conflict resolution mechanisms.
7. Self-organizing right of CPR institutions must not be challenged by external authorities.
- (8) Institutions must be integrated in the form of nested enterprises in case externalities exist.

(Ostrom, 1990)

Ostrom identified three major variables that would lead to sustainability of self-organizing CPR institutions as including (1) expected benefits, (2) expected costs, and (3) internal norms and discount rate. These are internal variables which are functioning in the mind of CPR's users and are responsive to the external world. She also catalogued situational variables of these variables that would be indicative of how the internal variables would realize. And this is where I would start.

Situational variables of Expected benefit

1. Number of appropriators. The number of appropriators would be the number of owners of the land included in the irrigation system. The number would vary when the land is rented out to more than one tenant farmers. Share-crop farming would also make the number fluctuate. The number of appropriators in the wet and dry season may not be equal. Generally, the number of land owners can represent the number of appropriators well but there are cases where land rent from the same landlords has been occurring over a very long period of time. There are also cases where tenants simultaneously rent land from more than one landlords. Some tenant farmers are actual appropriators for more than a decade. Considering that the number of appropriators will be used for rent dissipation calculation, the acreage of irrigable land has a replacement potential.

2. Size of CPR. If the irrigation supply is from a storage, the size can be estimated by the average storage over a period of time. If the supply is from a diversion structure like weirs or barrages, the highest level of retention and the average river flow over a period of time would give a rough estimate of the CPR size. If the supply is underground, the aquifer size can be estimated but generally technology is still not so precise about recharge and movement.

3. Temporal and spatial variability of resource units. The locations (head-end v. tail-end) of land to be irrigated would give a rough estimate when and how much an appropriator would receive the water. The spatial variability puts some irrigators in perpetual physical disadvantageous position and it is very challenging to devise some mechanisms (incentives, reciprocity, etc.) to override this problem. Temporal variability would depend on locations of land to be irrigated and the efficiency of the delivery system. Concrete lined canals would ensure an earlier arrival of water

than earth canals. The temporal variability would rely substantially on the congruence of rainfall pattern and farming schedule. The variability can be across the years as well as across the seasons. In an irrigation system where there is a storage that can be transferred across the year, the storage operation in the previous year would have some influence on the following year. In the year when there is an erratic rainfall pattern, the variability in the diversion system would be very wide. Much less water can be expected in the dry season cropping.

4. Current condition of CPR. How much irrigation water is available or can be expected from the system? What is the quality of the water? How reliable the water supply is? What is the capacity of conveyance system? How long does it take deliver water to each farm? What is the life of the irrigation system? Will it be functioning for quite a long period of time? Are the structures like dams, weirs, barrages, canals, checks, drops, pump houses, etc. working well? Will they need rehabilitation very soon? Is the rehabilitation difficult and costly? Probably, it is necessary to add the vision of the future size and condition of CPR. Is there any plan or are there some people wishing to tap the CPR both upstream and downstream of the system? Is there any imminent threat to the quality of water in the system?

5. Market condition of resource units. Generally, there is no real or direct market for irrigation water. The provision for water fee collection in the existing Public Irrigation Law has never been enforced. The only water market I have seen is in an eastern province where water company buys water wholesale from RID to retail to local people. More usually, the irrigators pay operation and maintenance fee to their groups based on the acreage of their cropped land. However, estimates of the current water availability and the current water use rates predict that the value of irrigation water will be higher. An investigation into the produce markets, and urban and industrial water markets would reveal a similar scenario. Farmers are gradually switching to crops with higher value, either at their own initiation or as prodded by extension workers. Rates of water for urban and industrial uses are increasing. A possibility that the value of irrigation water will be monetized cannot be ruled out.

6. Amount and type of conflicts. Most of the time, conflicts involve irrigation scheduling. Head-enders often started fanning their rice earlier than tail-enders.

When tail-enders still need water, water running towards their field often seeps into the head-enders' fields. The severity may not be very high as physical attacks are minimal. The other type of conflict is the maintenance of tertiary canals. Head-enders see no benefits of performing the work while the tail-enders will try to share work on the secondary canal maintenance so that head-enders help them with the tertiary canals. The social pressure on secondary canal commitment is stronger than that on the tertiary canal work. Again the intersectoral conflict, i.e. water for irrigation versus urban and industrial uses have to be considered. Until less than a decade ago that RID, that has been set up mainly to cater farmers, has started giving higher priority to urban consumers and environmental conservation above farming.

7. Availability of the data about 1-6. The data about 1-6 is obtainable. These types of data tend to be locale specific. There may be some similar aspects across irrigation communities but there may also be some subtle differences, particularly those in the social aspect, that would transcend other aspects. From an outsider's perspective, it needs a systematic study to obtain these data. In contrast, CPR users use their best estimates for decision-making.

8. Status quo rules in use. Currently RID is assuming the provider's role. RID has been set up since 1902 during the period of structural adjustment era with an aim is to centralize irrigation development in the country. Prior to the pro-growth period, much of irrigation development was done by local communities. Such pro-growth approach did stimulate national growth. Simultaneously, it put several local community institutions out of their places. Currently, there are very few number of people's irrigation systems. In a wider mode of practice, the government funded the construction of hundreds of irrigation systems of various scale without charge from irrigators. Subsequently, the systems are operated and maintained by RID, again without charge to irrigators.

Limited by topographical terrains, opposed by the proliferating environmental concerns, and realizing that the benefits of such development did not trickle down to the entire profile of the country, a re-orientation of irrigation development trend has been observed. Attempts have been made to distribute wealth through construction of smaller scale irrigation facilities in difficult areas. The burden of operation and maintenance of the previously constructed large scale systems begs for changes. Water users are intensively encouraged to form water

users groups at the farm outlet level. Where groups are observed as strong enough, they are encouraged to federate into a lateral level group. Hopefully, when lateral groups are strong enough, they can federate into a large group at the main canal level. At all levels, de jure rules as described in the design principles are prodded by extension officials. In some localities, the groups are very strong. Regrettably, in some localities, farmers did not unite. Overall, the scenario can be viewed as a responsibility transfer, and not really a power transfer. Plans to transfer operation and maintenance of the headwork to the groups have never been observed.

9. Proposed rules. Following Ostrom's prescription, I will hypothetically propose that the entire irrigation system inclusive of the head work should belong to the local communities. RID would assume the roles of regulator, information provider and monitor in case there are serious violations or externalities. The operation and maintenance would then be carried out by a professional management team under the supervision of some kinds of local water council.

Major benefits tend to be benefits in the long run. How long the run would be depends on the level of scarcity and the perception of irrigators of the inevitable subsidy removal. Instead of paying fee to the government, the proposed rules would give irrigators a more responsive and accountable management team. The irrigation scheduling, allocation across sectors, and negotiations on related matters would be conducted in the local setting.

Situational variables of expected transformation cost

1. Number of decision makers. If the process starts from the tertiary level, the initial number would be in the range of 10 to not more than one hundred. Decision makers would certainly include only land owners. They are very likely to transfer the cost to their tenants and share-croppers. Tenant farmers or share-crop farmers may not be allowed to take a decision-making role despite their status of real CPR users. The profitability of their farming will be taken into account by their landlords. As the process moves along, the initial number would be aggregated. Even though the number would eventually include different types of stake-holders (irrigators, non-irrigators, bureaucrats, politicians, environmentalists), the final number of representative decision makers would not be very high. The

disaggregated number can be used in cost-sharing. Meanwhile the aggregate number would indicate who can influence the decision.

2. Heterogeneity of interests. The irrigators' interests are likely to be homogeneous in nature, i.e. having adequate water for the highest cropping intensity. There may be slight difference when it comes to timing. Farmers in relatively higher terrain would express more needs for water in the wet season while farmers in the relatively lower terrain where more than two crops are probable would care about water availability during the possible third crop season. The longer the enterprise-nesting process runs, the more diverse interests will be incorporated. The downstream sub-systems are more likely to be concerned about siltation in the upper channel, and the adequacy of water for natural habitats where they can find supplementary food. With more publicized information, their concern regarding salinity leached from upstream sub-systems would be heightened. Conflicts of interest in quantity respect are more easily to resolve than the quality aspect.

3. Rules in use for changing rules. Currently, there is no rules in use for changing rules. Since most systems are constructed by using the national budget, to devise new rules would be very costly and take time. Opposition from many politicians who benefit from the status quo is very likely. Mobilization on the part of irrigators who vision less benefits would complicate the transformation process. However, this does not mean that it is impossible. A graduated process can be devised.

4. Skills and assets of leaders. In the areas where the systems are not very far from the urban centers, where populations have relatively high educational level or ample access to information, where poverty level is above the self-organizing threshold, it is easy to find skillful leaders of irrigators. A number of the population are likely to see opportunities for gains. They would be willing to invest and take the lead. This does not mean that only those people would gain. Others would also gain in proportionate to their investment and negotiation. Ostrom said a strong leadership would help to reduce the transformation cost at a significant rate.

The cultural meaning of leadership needs a careful consideration. In most rural parts of Thailand, social hierarchy is very distinct. Certain people have already assumed certain leading status. Leadership does not always translate into willingness to listen to others. The dynamics among the locals are to be

considered. Currently the traditional leadership which is often contributed to personal charisma is waning. Consumerism that tags along with development has been undermining the nostalgic paternal leadership in rural parts of Thailand. Even when paternal leaders have a plausible vision, it has become very hard for them to moderate the community forum. For example, a very respectable leader of an old irrigation association in northern Thailand has become so tired of the leadership position that he declined nomination in a new election term. Who would fill in this leadership vacuum in this transitional community is an intriguing question. It would tell where the community is heading.

Another aspect of group dynamics is the long-lasting hatred relationship across families. Like in southern Thailand, I heard that there were series of killings of each other family members to gain territorial and probably resources control and the rubber plantation owning families have even to hire body guards. They may want to use water for similar production purpose but competitiveness is so overwhelming. In such communities, how a leader would emerge to take charge of the self-governing institutions is a difficult question.

5. Proposed rules. I have no ideas where irrigators would obtain funds to pay the capital investment that the government has advanced for the construction of their irrigation systems. Will their institutions obtain capital improvement in the form of loans, or grant from certain funding sources? Will their institution decide to start with having debt and collect irrigation fee back from irrigators? Monetarily, the expected benefits would not definitely outweigh the upfront transformational cost. It is very likely that some far-sighted irrigators would try to negotiate for free capital or at least interest free capital.

6. Past strategies of appropriators. Before the centralization of irrigation development, irrigators were self-reliant. However, the technology in use at that time was not expensive. Only bamboo and rock weirs and earth canals featured the systems. After decades of free goods, the irrigators' strategy to cut down the transformational cost would be an attempt to take over the systems at the least charge possible. They may cite the reasons like a reduction in operation and maintenance cost currently shouldered by the government. The opportunity for the government to redistribute the fund to help develop the other 80% of the country's farmland.

7. **Autonomy to** changing rules. The irrigators would not have an autonomy to changing rules. The systems have been built with the government funds. The transformation will inescapably have to be endorsed by the government if it is going to happen at all.

Situational variables on monitoring and enforcement costs

1. Size and structure of CPR. After the institutional changes have been made, monitoring and enforcement costs at the tertiary level would not be very high. But **at** the nested enterprise level, such cost would be very high because included in that level are more capital intensive structures like headwork, big water gates, etc. and many irrigation systems cover a very large service area. At the nested enterprise level, staff monitors like ditch riders (as well as staff operators of the headwork) would reduce the cost of time and support from the government would be needed for enforcement. It is necessary that the new institutions have the police power to a certain extent.

2. Exclusion technology. Most irrigation systems in Thailand have surface supply and delivery is mainly by gravitational force. The exclusion can be easily achieved by not allowing connection of canals and pipeline or pumping by outsiders. A few are relying on ground water and pipe system. In this case the cost would be higher because only limited information about the ground water source is available. The intrusions by outsiders would be less visible because the subsystems are not connected above the ground as in surface irrigation. To successfully exclude outsiders, precise and expensive information regarding the aquifer formation will be indispensable.

3. Appropriation technology. The cost of appropriation technology will be more or less along the same line with exclusion technology. There will be less cost to the surface system than the ground water system. Irrigators will now assume all costs of appropriation without the government subsidy. They may be able to develop an appropriation system that answers their needs better.

4. Proposed rules. Regular monitoring and enforcement would be in charge of the members of the community institutions or their management teams. Only in the

case of the emergence of externalities or in the case of serious disruption of the **system** operation and maintenance that external authorities would intervene. Such intervention would not incur an extra cost on the institutions' side. A regular cost **in the form of tax** would cover the expense for the support.

5. Legitimacy **of** rules in use. If the ownership transfer is successful, the new rules **that do not** contradict the National Constitution should be considered as legitimate.

Situational variables on norms and discount rate

Ostrom listed the following as situational variables affecting internal norms and discount **rate**: (1) Appropriators live near CPR, (2) Appropriators involved in **many** situations together, and (3) Information made available to appropriators about opportunities **that** exist elsewhere. On page 88, Ostrom used secondary data to infer similarities **of** "robust" CPR institutions. Her description of such institutions include **the** following features.

1. People in the community all encounter "uncertain and complex environments. In other words, they have CPR problems to solve together.

2. The populations in the locations of the institutions "have remained stable **over long** periods of time". They shared the past and expect to share their future.

3. **In** the locations, extensive norms have evolved and proper behavior is narrowly defined.

In my opinion, such description has very limited usefulness. Considering the social pattern of today world, the chance of finding one such community is relatively much lower than the opposite. In my foundation micro-economic class, I have learned that a theory which has a very high predictive power but obviously lacks **a** plausible level of explanatory power may need to be fixed. This might be **the** case here.

I found this description very similar to that of water communities in northern Thailand some 700 years ago. Farmers in the mountainous region realized **that** they need to construct water weirs to stall the rushing water and divert it into

their **farm** ditches. If the weirs were not constructed, water would rush down the slope **to** the Central Plains too soon. In those days, mobility of people were very limited. **So**, the farmers shared very much of their past and viewed that they and their children would share the future. Hence, relatively low discount rate. In such communities, everybody knew each other well. The hierarchy was probably very clear. In the culture, the higher hierarchy perceived themselves and were perceived by others as having a paternalistic role. The rules of conduct were clear and social pressure was high. The Mangraisart law was developed and enforced regarding water uses. The institutional arrangement could be easily overlaid on Ostrom's CPR institution design principles. The rights of the people to use the water for what purposes were clearly defined. The priority of users were also identified. How and when the community would reconstruct the weirs (which were made of bamboo and stones and often partially or totally washed down every year) were stipulated. Who was in charge of what operations was defined. Monitoring was easily done in the community where people knew each other so well. There were graduated sanctions that could move to capital penalty in the extreme cases. There were also veto points and conflict resolution mechanisms. There were hardly challenged from Bangkok since at that time the location was in the local Lanna Kingdom. In brief, the institution met all the design principle and its description met all the listed features.

The point I would like to make is not whether her design principles derived from past experience would work or not. The question that I would like to raise is whether her assumptions about the setting of the institution, particularly the second and third points mentioned above, are realistically plausible. Today-world societal structure has greatly changed due largely to communication and migration. The chance for me to find a community which has such societal structure in Thailand would not be so promising.

Undergoing structural adjustment for decades, labor migration has become very common. The migrators tend to depart from the norms they used to hold on to when they were back home. The relatives of the migrators would become less dependent on the CPR because of remittance from migrators. In addition to decreased dependency on CPR, communication with the migrators as well as a better access to outside information have considerable appeal on the norms of the society. The norms would become very multiple and some of which are contradictory. To

use "internal norms" as monitoring device would be less promising. With increase mobility, people have more alternatives. Many people would still share considerable past but less and less would expect to share a future. Apart from the above-mentioned attributes of community setting, aspiration would have a lot of impact on institutional robustness. Asking several farmers about their aspiration for their children, most of the answers would be for them to obtain the highest education possible and have a secure salaried job. This shows that they do not care to see their children to share the future. Would this also imply less chance for them to develop a robust institutions?

I do not know what I perceive is factual or not. But the perception of this scenario leads me to think if "internal norms" would apply in the today CPR institutions. With less chance of common internal norms, what would be used instead? Is it possible to create an institutional or impersonal norm? How will it look like and how will it affect the discount rate? I need more knowledge on rural sociology.

Conclusions

The application of Ostrom's model on the proposed institutional changes from centralized government to self-rule seems to indicate that the expected costs would outweigh the short-run and medium-run benefits. The prevalent pattern of social changes have many negative impacts on the sustainability of the proposed institutions.

An application of the variables above has shown that more particulars have to be studied. Ostrom's intention to only identify the variables that would induce robustness of self-governing institutions does not relieve her from a connected commitment to investigate the transformation process. More details on transformation process would also help to identify some hidden variables that may interfere with the robustness of institutional changes. Ostrom has touched on it but very briefly when she talked about the three worlds. The emphasis of gradualism is indispensable. A sudden change from a centralized to a decentralized system when the overall situation has not evidently broken would not work, irrigators and politicians as well as bureaucrats are not convinced of the necessity of changes. Instead of a quick fix, a gradual amendment would help avoiding a social shock.

A where the poorest of the poor, e.g. landless farmers would be impacted most substantially. A sudden pullout of government role would certainly create long-term benefits if the local community can successfully devise their own institutions. Here is where Ostrom has not addressed. The starting point is not a zero point but the starting point is a centralized situation. The readiness of the power taker and the power returner is questionable. The current political structure is still heavily centralized. The idea of power return would surely face so much opposition that such plan would not survive.

In RID case, I would expect that opposition from my colleague bureaucrats will be very substantial. Currently, the Department has been allocated with a huge amount of annual budget and there may be political ties to the budget. Bureaucrats have clung to the prestige of huge responsibility for decades and would not let it go easily. What instrument needs to be used to ensure the survival of the institutional changes? Or to prevent the policy from deteriorating and resulting in turmoil? Can the bureaucrats be transferred to work and be accountable to the local institutions? How would the institutions pay for their salaries? Suppose the Department's on-going plan for operation and maintenance transfer is successful and irrigators can devise a very good structure for revenue stream, irrigators may be able to pay their employees. They would not be able to afford the whole number of them. Where the left-over would go? What needs to be done to help them with the career transition? These can be done with less difficulty considering the government's recent imposition of two per cent personnel growth.

I found that Ostrom's postulata of the central government's role as information provider and forum facilitator as extremely plausible. Currently, the Department disseminates only statistics of development and practical technology of irrigation. I feel the far-sighted technical information to irrigators and non-irrigators is very limited. Information distribution among officials and users is very asymmetric. Such distortion unfairly, intentionally and unintentionally, favors certain groups of people and camouflages a hidden political foul play. The Department's plan to divert more water from the northern region to further spoiling water users (irrigators, households, and industries) in the Central Plains reflects how information asymmetry would distort what can be equitable and efficient development. Other effects from such information asymmetry is detrimental to the environment. Externalities such as cross basin diversion and possible pollution

transport are kept away from people. When water scarcity is more imminent, instead of promoting the conservation by telling the consumers of the condition of local CPR, the government is considering investing more in order to tap remote resource. This not only spoils the group but also is detrimental to the remote resource where another group may be dependent on. A new information distribution environment would prepare bureaucrats and politicians for institutional changes.

Ostrom did not discuss what would happen if the central power is let go and the CPR institutions collapse. What would result amid such social instability? Given high instability in or muddy relationship regarding resources with neighboring countries, what would be the ramifications of the collapses? Several, if not most, rivers are connected. It is likely that the format will be nested enterprise. If one institution collapses, what would ensue? What if the institutions of the connected resources system are not successfully nested?

What are the linkages between the unconnected resources systems but may be existing in the same community? Ostrom did not discuss about the multiplicity of CPR institutions. It is not clear to me how many institutions one would be dependent on. If the number is high and there is an institution for every CPR, one may end up involving in so many institutions that one cannot remember. As has happened in California, there are so many kinds of special districts (e.g. water, reclamation, flood control, pest abatement, fire protection, etc.) in one location that residents would not be cognizant that they belong to such institutions unless a crisis occurs. And by the time the crisis occurs, it has already been too late. Will it be better to embed all these CPR institutions into the real local political institutions? Will that save transaction cost? However, there are questions in this regard. Can the political boundary be easily made to coincide with CPR physical boundaries? In Thailand case, the irrigation institutional changes will have to be concurrent with the institutional changes in the local administration aspect. Attempts have now been made to return a greater autonomy to the provincial level. Hopefully, in the near future, provincial governors will be elected in every province rather than appointed from Bangkok. The embedding of irrigation institutions in the local administration institutions would address the intersectoral allocation that Ostrom has overlooked.

Ostrom did not discuss problems relating to limiting access to CPR to a specific group who share common interest. One of Ostrom's design principles stresses that the boundary of the CPR and its users must be defined. Is water from reservoir used for irrigation alone? Will intersectoral allocation be easily coordinated if irrigation institutions are separate from other water related institutions. In case it is still necessary to limit it to only irrigation, what is the fair criteria for limiting the number. Only those who can pay for a concession? a permit? whoever come first? whoever need it most? (very subjective but sometimes needed). With demographic pressure, limiting the access would not be easily practiced. Some areas are not naturally endowed with adequate resources for survival or acceptable quality of life. How to address these problems? The fragile cases in the book are more interesting to me. It reflects the present day setting more than the success cases. Are we falling back to that demonic price mechanism again? If price mechanism is used, what else would follow? Will pricing be used in a wider water market like it is going to happen in California? If it is so, what would follow? It is hard to assess the impacts on the third party. If upstream irrigators want to sell their water to remote users, they will have to prove their the return flow and river flow will be the same.

As a junior RID staff member, I am not sure whether what RID is doing now is associated with letting go the power. Irrigators are encouraged to take more responsibility. This may only be an attempt to push away financial burden which has been too heavy to allow the central government to find resources to support water users left out from irrigation projects. Can this be a gradual transition charted by my predecessors and fall somewhat in the same line with Ostrom's ideas?