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**Indigenous Knowledge and Sustainable Commons:
The Case of an Indonesian Subak**

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ABSTRACT

This paper analyzes how an indigenous Balinese water-user organization (Whisnu Kerta subak) deals with religious and democratic principles of water management. Particularly, the paper examines how these principles are translated into an interdependence perspective that would result in fair rights and duties of the organization members, a key element to achieve sustainable commons. The paper also explains why outsider intervention may have threatened the sustainability of the whole water management system and the natural environment in general. The heart of this water management system is a strong belief in the Hindu religious doctrine that water was not only common property resources but a God-owned property, a part of nature which human beings are encouraged to utilize properly. Empirical evidence shows that key elements of the success story of Whisnu Kerta subak include fair and clearly-stated rules and agreements, equitable rights and duties among organization members, strong enforcement of any violations and ethical, social and religious responsibilities attached to the feeling of interdependence among members. This subak has been able to overcome defiance by government officials and the vested interests of local and regional elites mostly due to the homogeneity in ethnic and social status of its group members.

INTRODUCTION

The term *subak* is usually associated with Balinese society and the Hindu tradition of managing agriculture, particularly lowland rice fields. These traditional, religious-related water-user organizations maintain water availability throughout the year and, in general, achieve sustainable commons. For the most part, researchers have undertaken various case studies of the original *subak* in Bali, Indonesia, to analyze primarily the performance of such traditional irrigation systems and the individual responses of such water-user organizations to a variety of government policies to increase rice production (Geertz, 1967, Bilkerbach, 1973; Hobart, 1982). As has been recognized widely, Indonesia then achieved self-sufficiency in rice production in 1984 after being known as the biggest rice importer in Asia.

Given the great importance of *subak* in irrigation management system and in sustaining the natural environment in general, the research reported here addresses the issue of how a *subak* was managed. Particularly, this paper aims at answering questions of how these managing principles are translated into interdependence relationships that result in a fair distribution of

rights and duties to organization members. Furthermore, the paper also attempts to explain why outsider intervention may have threatened the sustainability of the whole water management system and the natural environment in general. The study is an in-depth case of the Balinese *Whisnu Kerta subak* water-user organization in the Banjit subdistrict, North Lampung, Sumatra-Indonesia.

THEORY

A religious-democratic water management system is probably the best way to describe the characteristics of *subak* systems in the Balinese-Hindu villages of Indonesia. Examples of religious-related water management from other developing countries that have obtained enormous attention in the literature included the *Muang Faai* irrigation system in Northern Thailand and the traditional *Gal Oya* irrigation system in Sri Lanka. The advantages of a *subak* system as an effective and efficient water management system in a local level has been well-documented in the literature on water-user organization (Geertz, 1967; Bilkerbach, 1973, Rupa, 1985; Lansing, 1989, 1991)

In this literature, no consensus on single definition of the term *subak* existed. The term usually refers to an irrigation institution because of the central role of *subak* in the regulation of water supply. The history of *subak* is as old as the history of Balinese agriculture. The Balinese have practiced rice agriculture since the early sixth century (Rupa, 1985). Their mountainous landscapes inspires early Balinese to build water canals up to several kilometers long. Raka (1957) defines *subak* as a rice-field unit irrigated from a river or a single dam or canals along the river. A river, road or village separates one *subak* from another (cited in Rupa, 1985).

However, according to Geertz (1967), *subak* is also an agricultural planning unit, an autonomous legal corporation, and a religious community. All individuals owning village rice terraces are automatically members or citizens of *subak*. *Subak* deals with rights and duties among the members, such as public obligation, which was enforceable by fines, regulations concerning land use, legal transactions of land transfer, and collective ritual ceremonies. All of these are institutionalized and explicitly explained in the order of law of *subak*. Members of *subak* are not only responsible for economic and social activities, but more importantly, according

to Hinduism, they are also responsible to their God (Rupa, 1985). In this context, members of *subak* have strong feelings of responsibility toward the Goddess Whisnu, the deity who is in charge of managing the universe, according to the Balinese Hinduism trinity doctrine.

Almost all *subak* activities are preceded by a religious ceremony. The Hindu religion holds that human beings are powerless and totally dependent on their God. Balinese Hindu prefer to practice ritual ceremonies rather than to argue the mechanic of the disaster or to blame somebody else (see Rupa, 1985). For example, in response to a very long drought, the Balinese Hindu will slaughter cows and chicks as a method for asking their God to deliver rain. If a heavy-pests problem emerged, the society prays to their God to put away all crop destroyers.

Thus, the heart of most water management systems among members of Balinese society is a strong belief in the Hindu doctrine that water was a God-owned property, a part of nature which human beings were encouraged to utilize properly. This belief system is known as *Tri Hita Karana* -- translated as Three Sources of Prosperity -- which includes (1) a spiritual network system consisting of God as the main power of the universe, (2) human beings as managers of the earth, and (3) nature (water, land, and air) as a place where prosperity could be found. Each major irrigation and drainage scheme is considered a single self-contained ecological unit. This unit, usually located along a narrow strip of land centered around a larger river, consists of one or more water-user organizations, or *subak* in this context.

The debate on why and how *subak* water management systems are successful typically focused on whether the irrigation management is entirely local, autonomous, religious entity (Geertzian-type of argument) or centrally organized by state bureaucracy (a Marxist-type of argument). Geertz (1967) suggests that a complex ecological order is both reflected in, and shaped by, an equally complex, local ritual order, which at once grow out of it and is imposed upon it. Irrigation is organized at the local level by the timing of the rituals connected with the rice cult.

Geertz' argument is challenged by Hobart (1982) who concluded that Hindu rituals are not part of a master plan for cultivation. Based on his study of a single *subak* in the district of Gianyar, Bali, Hobart suggests that the intervals marked by the rice rituals do not match the phases of agricultural labor because the rituals do not follow the natural rhythm of plant growth.

Recently, Lansing (1989, 1991) offers a third alternative he called a "water temple" hypothesis. He suggests that Balinese irrigation systems are centrally organized by a system of water temples, separate from the state, which do significantly more than manage irrigation or provide water for crops. In Balinese rice terraces, water manipulates the states of the systems at ascending levels in regional hierarchies. The permanence of water temple networks contrasts sharply with the instability of the traditional Balinese state.

While these hypotheses might be useful in analyzing regional irrigation management as a whole, they do not take into account the religious-democratic principles of a water-user organization that helped sustain this aspect of the Balinese natural environment. The evolution of these hypotheses implies that the workability of *subak* irrigation system is based on the institutionalization of working rules using religious and democratic principles. The norms and principles that had been obeyed for years offered the opportunity to allocate water resource rights and benefits in a more sustainable and effective manner.

Previous studies on *subak* irrigation management system are mostly based on those operating on Bali island, Indonesia. As of this writing, no case study is identified which assesses how Balinese migrants who live on *other* Indonesian islands are able to employ religious and democratic principles and to adopt *subak* management systems as the norms and working rules in sustaining the natural environment. In the present case study, the rules and regulations of a *subak* organization, namely *Whisnu Kerta*, in Lampung Province, are analyzed. The organization is managed by religious and democratic principles and is able to maintain sustainable water resources, particularly irrigation management. Therefore, the proposition to be explained in the present study is that the effectiveness of the *subak's* religious and democratic principles has resulted in a feeling of interdependence among its members, regardless of class or hierarchical status.

METHODOLOGY

Data

This case study is based on an in-depth assessment of *Whisnu Kerta* as a *subak* water-user organization. Data and other primary information were collected during a field study conducted from July to December 1988. The field research was a part of interdisciplinary studies of Tulang Bawang River Basin Master Plan of Lampung Province in 1988/1989. Direct interviews with eleven key informants were conducted to determine how the *subak* lived in harmony with nature. The eleven informants included two religious leaders, two community leaders (both formal and informal), three first-generation settlers, two community nonleaders, and two top local government officials of Lampung Province. They were chosen because of their competence in, and familiarity with, most *subak* issues.

Open-ended questionnaires were used for conducting the interviews. This allowed informants to explain more thoroughly any information related to the study. This method avoids "yes/no" answers from interviewees and yields more aspects of the informant's idea so that the psychological and epistemological gap between researcher and informants is reduced. This method also fostered discussions on how a *subak* could maintain the availability of irrigation water throughout the year, even with minimum rainfall.

Secondary data, mostly quantitative, and statistical information were collected from the recent documents published by Indonesia's Central Bureau of Statistics, provincial and district offices. Other supporting materials were obtained from previous studies on *subak* and the literature related to this topic.

Measures

The most important measurement in this case study is how much the religious and democratic aspects of *subak* organization were translated into a fair set of rights and duties of its members, either as an organization member or as a community member in general. Measurements of religious aspects of the organization were approached by how often the community activities were accompanied by ritual ceremonies and by ritual practices of individual

members. Democratic aspects of the community were measured by how much the voice of organization members was incorporated to govern the organization. In order to minimize biased information from religious and community leaders, cross-verification was obtained based on the interviews with the other key informants (first settlers and community members). The perspectives of informants who were first settlers in agricultural frontiers and even local government offices contributed significantly much to the enrichment of case study analysis. Those of community non-leaders, who were directly involved in daily *subak* activities, also strengthened the in-depth examination about the role of *subak* in sustaining the natural environment. In additions, the researcher observed directly community meetings, the temples, canals, distribution tables and the rice fields.

RESULTS AND DISCUSSION

The Setting

The existence of Balinese society in Banjit subdistrict of Northern Lampung coincides with the eruption of Mount Agung in Bali in 1963. The government resettled an enormous amount of Balinese landless and homeless due to the volcano's destruction in Sumatra, Sulawesi and Kalimantan. The *Whisnu Kerta subak* consists of Balinese migrants who settled in the Banjit subdistrict, as of this writing is administered under the District of North Lampung. The *subak* is located about 40 kilometers northwest of Kotabumi, the capital of North Lampung and about 160 kilometers northwest of Bandar Lampung, the capital of Lampung Province. In Banjit, more than 20 percent of its 33,897 residents are Balinese or Balinese descendants (CBS, 1990), occupying three the villages which were North, Central and South Bali Sadar. Their economy was based on rice and secondary food crops in the lowland, and coffee in the upland.

The high rice-yield contribution of the three Balinese villages of the North Lampung economy is associated with the success of irrigation management in these villages. During the 1987/1988 planting season, the rice-fields area in Banjit subdistrict was 2,108 hectare (one hectare is about 2.5 acres). More than 700 hectares of irrigated rice area, mostly planted with IR-64 variety, are located in the three Balinese villages. The average productivity of these Balinese villages is more than 5.5 metric tons per hectare, compared to the provincial average

of only 4.0 The expansion of lowland rice fields is also encouraging, mostly due to the availability of irrigation water. Recent statistics indicated that total rice-field area increased to 2,936 hectares, of which more than 800 hectares of irrigated rice area are located in the three Balinese villages (CBS, 1990) The Balinese economy is very dependent on rice production activities, more so than pepper and coffee, which are grown by local Lampungese or Javanese migrants in the neighboring villages

As mentioned earlier, irrigation management in these Balinese villages is implemented through a *subak* system that maintains the availability of irrigation water throughout the year The *Whisnu Kerta subak* has 101 members and organized about 40 hectares (100 acres) of irrigated rice fields. The water flows from South to North, with the Way Umpu river, one of many large rivers in the Tulang Bawang River Basin of North Lampung, its source. The name of the *Whisnu Kerta* can literally be translated as the "willingness of Goddess Whisnu". The *Whisnu Kerta subak* is primarily responsible for maintenance of irrigation hardware, coordinating the water flow, rice planting, harvesting and, most importantly, the spiritual aspect of water distribution In addition, the *subak* organizes and administers land titles and land ownership Key informants for this research stated a strong preference for *subak*, in lieu of government agencies, as the agent of public administration

The *Whisnu Kerta subak* also administers the collection of "fees" for those who did not have irrigated rice fields but want to be members. Given that all members have a common interest in fair and prosperous water distribution, key informants stated that the *Whisnu Kerta subak* is very effective in encouraging members to have a sense of belonging to this organization In the only community meeting held during the field study, almost all members actively participated in a variety of organizational activities Five of the 101 members did not attend the meeting, because they were sick or away from the village, demonstrating that rights and duties have fostered strong interdependence among the members

The engineering of water inflow (irrigation) and outflow (drainage) is accomplished by simple partitions based on the area of the rice field. All other technical factors such as the heights, the slopes, and the thickness of distribution table are carefully designed and calculated

For instance, suppose the rice fields to be irrigated are 5, 10 and 3 hectares. The distribution table has to have the ratio of 5:10:3 exactly. The dams are arranged one below the other down the river canyons. Once water gets into the paddy field, it is distributed using an extended series of carefully graduated bamboo or palm stems. The water flows into a whole area in such a way that a single incoming "artery veins" out into dozens of small "rivulet" directly feeding one terrace or a small group of them. This engineering system would also magnify the interdependence perspectives among *subak* members, by which a "free-riding behavior" performed by one member could be easily recognized by other members.

Moreover, the performance of *subak* systems is based upon *tenah*. The *tenah* is a unit of land to be irrigated, the amount of rice seedlings needed to plant and the amount of paddy harvested. "[T]he sum of total *tenah* in a *subak* adds up to its total water supply, to its total area, to its total rice-seed demands, and to its total rice production" (Geertz, 1967, p. 230). This *tenah* is also the basic unit of *subak* taxation, agricultural planning and land transfer. Rights and duties of *Whisnu Kerta* members are expressed in *tenah*, with the exception of voting rights. A member could only have a single vote for electing organizational leaders, which is normally once in every five years, and in determining agricultural policy, no matter how large his *tenah*. In reality, however, such as the case in a *subak* in the Bali island (Geertz, 1967), some large *tenah* holders tried to include their individual interests in policy formulation. In Balinese-migrant society where the average *tenah* holding is about the same (2.5 hectare) such as in the present case study, individual interests in policy formulation were not transparent. As of this writing, yet the influence of one member who is economically more prosperous than other community members, on *subak* policy formulation is not significantly tangible. According to the informants, the feeling of interdependence among members, which is a key factor for *subak* community in overcoming almost all daily problems, and could prevent the intervention of vested interests in *subak's* policy formulation. In addition, membership in the *subak* is ultimately superior to any other social classification, allowing the organization to act against the interests of the well-off rather than in their favor. The main reason why membership matters most compared to the classical issues of the Hindu caste system is because the Balinese community in these three villages homogeneously originated from the lowest level of Hindu caste system.

Rights and Duties: An Interdependence Perspective

As mentioned previously, the fundamental principle of *Whisnu Kerta* members' rights is that water is a common property so that everyone's rice field needs to receive enough water. No one could take control of the water by force. The water must be used according to the Hinduism principles which are interpreted through the communal rules and agreements formulated in the society meeting. Meetings are generally held every fifth Sunday or about every 35 days. The rules and agreements discussed at the meeting govern how the water is to be distributed, how barriers are to be maintained and how the reservoir is to be preserved. The technical side of this agreement is formulated in the initial design and the maintenance of water distribution equipment. The formal side of this agreement is translated into a bundle of rights which revealed freedom, justice and equality of the members, given the caste system in Balinese Hindu.

Members of *Whisnu Kerta* have rights to speak and deliver ideas, and vote -- only if necessary for advancing the organization's sustainability -- at any community meeting. As one may notice, the practice of democracy in Indonesia is generally based on compromise and agreement of the members. Voting is undertaken only when agreement cannot be achieved through normal community meetings. When a meeting ends up with a voting, which is usually spontaneous and on-the-spot, a quite serious problem existed. According to the informants, a voting might be necessary to decide whether a frequent and intense violator of *subak* rules and regulations need to be rejected by the community or not. The objectives of community meetings also includes the discussion of organizational and community problems, such as water drainage, coordination of planting, weeding and harvesting period, ritual ceremonies of all activities and so forth. When members are satisfied with their rice-yields, the meetings functioned as a community gathering, where religious and entertainment activities are performed. Members also have the rights to report any shirking and violations performed by others -- such as water stealing, intentional or unintentional thinning the path walk between two rice fields, and any efforts to maintain distribution water tables without confirmation of organization leaders. In addition, members shall report to organizational leaders any other problems, such as cattle or poultry plundering in their rice fields. The elected discipline committee, which has formal responsibility for monitoring water distribution and maintenance of the canals, investigated these

claims and set punishments strictly according to the principles of *subak* regulations. However, not all members' rights are explicitly written in the law of organization, since some rights are generally common law, which have been acceptable for many years in the Balinese society.

Duties assigned to every *Whisnu Kerta* member include participating in community meetings, obeying all society agreements, and paying all fees, taxes and fines. Members are required to participate in social and organizational activities related to the construction and maintenance of irrigation and drainage schemes. For example, cleaning out the canals and waterways is done on rotational shifts among members. All activities are enforced with fines. The amount of fines is instituted in the community agreement. Basically, the level of participation, not the voting, in community activities is dependent upon how large the *tenah* the members own. Four major types of fines exist in *subak* society (Rupa, 1985). Members could be fined for (1) missing an organization activity, (2) coming late to such activities, (3) stealing water, and (4) neglecting obligations in either ritual or physical activities. Fines are collected at community meetings and the rule of thumb of *tenah* is also applicable in determining the amount of fine. For the same level of violation, a larger *tenah* holder would receive a higher fine than a smaller *tenah* holder. During the period of field observation, no major violations occurred. In the literature of *subak*, fines and penalties had significant social sanction, such as being left out or abandoned by the society, and religious consequences, such as feeling guilty in front of God (Rupa, 1985).

To conclude this subsection, each person in *subak* community is regarded equally as an important decision maker in the water-user organization, regardless of his/her *tenah*. The feeling of interdependence among *Whisnu Kerta* members is encouraged by the fact that any shirking by one person could harm others and any water stealing could lead to dearth especially among downstream rice fields. Under the water distribution and drainage system, all side-canals are open for inspection by others, by the discipline committee, and even by everyday people passing the irrigated rice fields.

Potential Defiance and Resilience

The advantages of the traditional irrigation system encouraged all water-users to have a sense of belonging with the irrigation scheme. Frequent meetings and face-to-face contact among villagers in the course of their tasks could build a personalized, community oriented web of information, commentary, teasing, jokes and indirect criticism which ensure that any problems with the irrigation system were to be widely discussed even without formal meetings (for further discussion on this aspect, see Tongdeelert and Lohmann, 1991). As probably the case in other traditional irrigation systems, the *Whisnu Kerta subak* faces potential defiance from the intervention of outsiders. Elements of modernization include pressures for integration with the national water-user organization system and the introduction of sophisticated irrigation technology. As of the time of the field study, the *Whisnu Kerta* subak has maintained its independence from modernization pressures through the flexibility of its rules and agreements.

Three potential threats to the way *Whisnu Kerta* was traditionally managed originated respectively with the wealthy, the poor, and government officials. From the field observation, the researcher was impressed that defiance from local and regional elites was not significant in the *Whisnu Kerta subak*. Defiance from the poor was not significant either. Issues of land holding or land tenure in a complex caste system was negligible because resettlers in Banjir subdistrict is homogenous consisting homogeneously of the lowest caste. Homogeneity in ethnic and social status and group solidarity encouraged interdependence among the members to overcome collectively some forms of defiance. In this sense, the resilience of *Whisnu Kerta* is probably much better than the original *subak* organization in Bali, where a rigid caste system has taken effect over the years. As explained previously, *Whisnu Kerta* is very flexible in serving both the rich and the poor, the big *tenah* and the small *tenah* holder. Therefore, the defiance from both the local elites and the poor is not very prominent, though such defiance could be very serious in the future.

The strongest potential for defiance to the *Whisnu Kerta subak* is government intervention. This dilemma is faced not only by the *Whisnu Kerta* but also the original *subak* in Bali and other local organizations. Government assistance is necessary, especially to refurbish the dams and

water-distribution tables. Organization leaders and some members view the assistance as helpful, claiming it allowed them to reduce the amount of irrigation maintenance. The permanent dam is more durable, that is less likely to be destroyed by heavy water flow. Also, concrete water-distribution tables could also prevent water theft by any shirking members. However, government assistance could lead to high dependency and control, undermining the local organization (see Esman and Uphoff, 1984). In the case of *Whisnu Kerta subak*, the government could claim that water management systems in the three Balinese villages of Banjit subdistrict were part of the greater Way Umpu Irrigation System. Improved management of irrigation systems play an important role in a significant increase in rice production across the country. Thus, the national government could try to intervene in the management of *Whisnu Kerta* on behalf of the broader population. The government is very concerned with maintaining the national target of rice self-sufficiency levels achieved in 1984. Nonetheless, as of the field study, most *Whisnu Kerta* members do not believe that government assistance threatens the sustainability of their organization. The resilience of this organization originated in the spiritual grounding that mobilized members to come to work together, to dig, and to clean silt deposited throughout the canals. All of these activities are accompanied by either small or large religious ceremony.

In the near future, *Whisnu Kerta* could be in danger of losing its freedom of action and falling under the control of more powerful outsiders. One of the organization's leaders is a part-time government employee who is charge of supervising water distribution in the greater Way Umpu Irrigation Project of North Lampung. This gentleman is a young, progressive and well-educated Balinese descendant, who also has obtained some practical training in irrigation techniques and managements. His ability to lobby some local government politicians is acknowledged. He is able to bring some "modernization" of irrigation schemes such as cemented, permanent dams and distribution tables into the traditional irrigation system of the *Whisnu Kerta*. Indeed, representatives of the government are impressed with the success story of this organization in managing and ensuring the water availability throughout the year. The government later includes *Whisnu Kerta* on a list of government-formed water-user associations, which have a provincial headquarter in Bandar Lampung and a national headquarter in Jakarta. On a larger scale, this association was also affiliated with international public irrigation,

organized by International Irrigation Management (IIM). The *Whisnu Kerta subak* could lose its independence from government officials, especially as an agricultural planning unit and autonomous legal corporation. How this change could effect the religious and cultural value of the organization, however, is still not known. Most agricultural planning elements are established from the provincial or even national agricultural extension office. Agricultural activities in this organization usually follow the "instruction" conveyed through organization leaders by the extension agents employed in Banjit subdistrict.

In additions, minor differences exist between the "migrated" *subak*, such as *Whisnu Kerta*, and the "original" *subak* in Bali. As a tax collection and a local body of land tenure administration, the jurisdiction domain of *Whisnu Kerta subak* is not broad. The organization deals mostly with fines and fee collection for internal purposes. While in the "original" *subak* in Bali, organization leaders are in charged of tax collection. However, according to Esman and Uphoff (1984), the organization leaders who are involved in tax-collection activities are prone to overtax members and this led to corruption. Geertz (1967) also notices that government officials in the original *subak* in Bali are prohibited from holding any position in *subak* organization. However, such is not a *Whisnu Kerta* water-user organization policy. Whether this kind of flexibility threatened the sustainability of *Whisnu Kerta* organization or expanded the domain of this organization was another interesting issue worthy of future research.

CONCLUSION AND RECOMMENDATION

Several important conclusion and recommendations could be drawn from the case study of *Whisnu Kerta* water-user organization and several *subak*-types of organization anywhere in the world. First, *subak* is not a system for solving "water problems", rather it is a means for Balinese society to manage water to meet local needs in lowland-rice agriculture and to sustain the natural environment. Religious and democratic principles of *subak* organization are able to govern the organization and its members to be interdependent each others. As a result, the rights and duties of water management and the sustainability of natural environment and other activities could be enforced in such a way that matches the ways of life of the communities. Second, the role of this organization in sustaining the natural environment could be seen in the mutually supportive relationships between communities, natural resources, and production activities. Future research on the *subak* organization in Northern Lampung or anywhere outside Bali island should include how the "modernization", such as the development of materialistic ideology, may intervene and how the religious and democratic principles may be eroded. Third, the government should regard such forms of local organization as a partner and source of ideas in rural development and sustaining natural environment, rather than building a subordination ideology for local organization. Fourth, the *subak* principles have reminded even environmentalists how to live together with nature in friendship and submission, rather than to master it. Finally, the indigenous knowledge such as the water-user organization of *subak* is very unique and might be limited to Hindu-Balinese society. However, the working system of the *subak* in achieving the sustainable commons could be transferred to other water-user organization throughout the world and to other common-property resources management. Even though to adopt and apply *totally* the traditional irrigation system of *subak* into other rice-dominated and dependent societies is probably impossible.

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