structures. Once again, the *sedahans* were relegated to the role of agricultural tax collectors. But this history would hardly have made an appealing subject for an essay in the *Koloniale Studiën!*

As for the water temples, we have already seen that there is evidence that the Dutch were aware of the existence—and even some of the practical functions—of the temples associated with farming and water control. But it appears that once the temples had been pigeonholed as religious institutions, their practical functions became invisible. Although the colonial archives provide useful observations of the workings of the water temple system, the system itself was not detected because it rested on a system of power relations so ephemeral, from the point of view of a colonial administration, as to be imperceptible—"an external whisper, a beating of wings that one has difficulty in hearing in the serious matter of history."[59]

CHAPTER TWO

The Powers of Water

WE HAVE DONE, for the moment, with the history of colonial scholarship on Bali. Our concern is no longer with the development of the colonial discourse on the state but with what this discourse failed to discover. With the collapse of the Dutch empire after World War II, one might imagine that the question of the role of the state in Balinese irrigation would vanish into the limbo that had already claimed such topics as the morality of the opium monopoly. But by that time, Balinese irrigation had already entered the literature of Western scholarship as a case in point for one of the most enduring debates in political theory.

For over a century, materialist social theory has proclaimed a link between the management of hydraulic irrigation and the centralization of power. For Marx, as we have seen, "The prime necessity of an economical and common use of water . . . necessitated in the Orient . . . the centralizing power of Government."[1] But Marx was faced with the difficulty, pointed out to him by Engels, that his model of an "Asiatic mode of production" could not apply to existing states then under European rule. Marx replied that an "intact example" might still be found on the island of Bali.[2] A century later, Karl Wittfogel found himself in a similar bind: his model of "Oriental despotism" described early states, not those of the twentieth century. Like Marx, he suggested that a still-functioning example could be found on Bali.[3] But the evidence from Bali was contradictory. Some colonial authors, like Liefrinck, portrayed Balinese irrigation as a decentralized system managed by hundreds of *subak*s. Others, like Happé, maintained that the Dutch were merely restoring a strongly centralized royal irrigation system that had fallen into decay in the nineteenth century. Thus it proved difficult to decide whether Bali actually supported the basic thesis that the technical requirements of irrigation management encouraged the centralization of power in the state.

Fieldwork by anthropologists in the postcolonial era led to a renewed emphasis on the role of the *subak*s in irrigation management. Indeed, thanks largely to the work of Clifford Geertz, the *subak* system became a celebrated example of local-level irrigation control.[4] But because of the controversy over irrigation in the colonial era, questions remained concerning the role of centralized irrigation management. As recently as 1976, those conducting a cross-cultural comparative study of irrigation

and power concluded that the evidence for centralized control of irrigation in Bali remained ambiguous.[5]

Part of the difficulty in answering this question was due to uncertainty about the actual technical requirements for the management of water in Balinese irrigation systems. Were the *subak*s "melons on a vine," each drawing water as needed from a constant source? In other words, could each *subak* function as an autonomous unit? In this chapter, we will evaluate the practical requirements for water management in Bali as a necessary prelude to an analysis of the social relations of production.

ARTIFICIAL ECOLOGY

Every year, several thousand new articles are added to the scientific literature on rice. The tremendous sustained productivity of wet-rice paddies has made rice the single most important food crop for human beings and enabled civilizations like Bali to develop. One of the earliest known writings in the Balinese language, a royal edict from the eighth century A.D., refers not only to rice harvests but to irrigation tunnel builders.[6] The oldest human settlements in Bali are concentrated in the best rice-growing areas, where it appears that some terraces have been under continuous cultivation for a millennium or more. By contrast, all other systems of irrigated agriculture are subject to a gradual decline in productivity as a consequence of salinization and loss of soil fertility.

The Balinese do not build irrigation tanks or storage dams, so irrigation is dependent on the seasonal flow of rivers and springs. About half of the 162 named streams and rivers on the island flow only during the rainy season, which lasts from November through April. Bali is a relatively ancient volcanic island, located in a region of heavy monsoons. Nearly all Balinese rivers do not flow at ground level, where irrigation would be easy, but in deep channels on the flanks of the volcanos. Gaining access to such rivers for irrigation poses a difficult engineering challenge. Most Balinese irrigation systems begin at a weir (diversionary dam) across a river, which diverts part of the flow into a tunnel. The tunnel may emerge as much as a kilometer or more downstream, at a lower elevation, where the water is routed through a system of canals and aqueducts to the summit of a terraced hillside. In the regions where rice cultivation is oldest in Bali, irrigation systems can be extraordinarily complex, with a maze of tunnels and canals shunting water through blocks of rice terraces. Because the volume of water in the rivers during the wet season can be ten times greater than the dry season flow, the irrigation system has to cope with conditions ranging from a trickle to flash floods. Irrigation systems

originating at different weirs are often interconnected so that unused water from the end of one irrigation system can be shunted into a different block of terraces or returned to a neighboring stream.

To appreciate the level of precision required for the system to work, it is necessary to understand something about the basic dynamics of the paddy ecosystem. In essence, the flow of water—the planned alternation of wet and dry phases—governs the basic biochemical processes of the terrace ecosystem. A general theory in ecology holds that ecosystems which are characterized by steady, unchanging nutrient flows tend to be less productive than systems with nutrient cycles or "pulses."[7] Rice paddies are an excellent example of this principle. Controlled changes in water levels create "pulses" in several important biochemical cycles. The cycle of wet and dry phases alters soil pH; induces a cycle of aerobic and anaerobic conditions in the soil that determines the activity of microorganisms; circulates mineral nutrients; fosters the growth of nitrogen-fixing algae; excludes weeds; stabilizes soil temperature; and over the long term governs the formation of a plough pan that prevents nutrients from being leached into the subsoil. Potassium, for example, is needed for rice growth and depends largely on drainage. Phosphorus is also essential and may be increased more than tenfold by submergence.[8]

The main crop produced is, of course, rice. But in addition, the paddy also produces important sources of animal protein, such as eels, frogs, and fish. Even the dragon-flies that gather over the rice to hunt insects are themselves hunted by little boys, who roast and eat them.[9] Most paddies support a large population of ducks, which must also be carefully managed because they will damage young rice plants if left untended. After each harvest, flocks of ducks are driven from field to field, gleaning leftover grain and eating some of the insects, like brown planthoppers, that would otherwise attack the next rice crop. Traditional harvesting techniques remove only the seed-bearing tassel, leaving the rest of the stalk to decompose in the water, returning most of its nutrients to the system. Depending upon the danger from rice pests, after harvesting farmers may decide to dry the fields and burn the stalks, thus killing most pests but losing some of the nutrients in the harvested plants. Alternatively, they may flood the field and allow the rice stalks to slowly decompose underwater.

As a method of pest control, the effectiveness of drying or flooding the fields depends on cooperation among all of the farmers in a given block of terraces. For a single farmer to try to reduce the pests on a field without coordinating with neighbors is useless because the pests will simply migrate from field to field. But if all of the fields in a large area are burned or flooded, pest populations can be sharply reduced. Both kinds of fallow

periods—burnt fields or flooded—are effective techniques for reducing the population of rice pests, but both depend on synchronizing the harvest and subsequent fallow period over many hectares. How large an area must be fallow, and for how long, depends on the species characteristics of the rice pests. Major pests include rodents, insects, and bacterial and viral diseases.

Just as individual farmers manage their paddies by controlling the flow of water, so larger social groups control pest cycles by synchronizing irrigation schedules. The role of water in the microecology of the paddy—creating resource pulses—is duplicated on a larger scale by irrigation cycles that control pest populations by flooding or draining large blocks of terraces.

WATER CONTROL

Until quite recently, rice scientists were unaware of the existence of this method of pest control. Studies of traditional Asian systems of wet-rice cultivation assumed that pest control was beyond the capability of traditional farmers until the advent of chemical pesticides. The little research that was done on the sociological aspects of rice production focused not on the ecological effects of traditional systems of irrigation management but on how to educate farmers in the effective use of agrochemicals. New agricultural policies based on these ideas were introduced in Bali in the 1970s as a means to increase rice production. Farmers were required to plant high-yielding varieties of rice, and very large quantities of pesticides were applied to the fields, with disastrous results. World Bank officials concluded in a recent study that pesticides have already "pervasively polluted the island's soil and water resources."[10] We will have more to say about this history in chapter 6. But for the moment, the point is that the social systems of water management that sustained the ecological productivity of Balinese rice paddies for centuries do not function automatically. It is perfectly possible to grow rice with chemical fertilizers and pesticides and ignore the biochemical cycles that sustain rice growth in traditional paddies. Indeed, on a short-term basis, extensive use of agrochemicals make it possible to dramatically increase crop yields, if sufficient water is available. Thus the answer to the question of the types of social control required for irrigated rice production will differ drastically, depending on whether one approaches the question from the point of view of a biologist studying traditional farming systems or an agronomist studying systems dependent on chemical inputs. From the latter perspective, all that is needed from the irrigation system is a sufficient supply of water. The timing of irrigation is not thought to have any influence on productivity. Instead, how much rice is grown depends on the rice variety and the amounts of fertilizer added. But for the systems ecologist, the timing of irrigation appears to be the key influence on the growth of the rice plants and other food species and maintenance of the high productivity of traditional wet-rice paddies.

One could argue, then, that the requirements for social control of irrigation in Bali have become much simpler now that agrochemicals and high-yielding rice varieties are available. But the problem is not quite so simple. In response to the threat of severe toxic contamination from pesticides and gradual loss of soil fertility, the government of Bali now strongly supports the use of traditional techniques of coordinated fallow periods as the primary method of pest control. Perhaps more importantly, the need for closely coordinated irrigation planning is built into the engineering structure of most Balinese irrigation systems.

As mentioned earlier, the rugged topography of Bali strongly influences the design of irrigation works. In a different sort of physical environment, with large rivers flowing through broad, flat rice plains, small groups of farmers might be able to tap directly into main irrigation canals without worrying very much about their neighbors. But in Bali, virtually every farmer depends on an irrigation system that originates several kilometers upstream and flows in fragile channels through the lands of many neighbors before reaching individual fields. A brief interruption in the flow will destroy a farmer's crop, and an unexpected downpour of rain may wreck terraces and irrigation works unless it is quickly shunted away. Even the largest irrigation structures are highly vulnerable. The weir in the river that provides the water for the main canals is likely to be made of earth, logs, and stones and may easily be washed away by flash floods. Moreover, the amount of water that reaches the weir in the dry season may be strongly affected by the cropping schedules of upstream neighbors.

For all these reasons, it is clear that the productivity of traditional Balinese rice terraces depends upon precise control of irrigation on the scale of several hundred hectares. The social units controlling irrigation must, at a minimum, include all of the *subak*s that share water from the same weir. But is there a need for more widespread cooperation from one weir to the next?

We can explore this question with a brief survey of hydrological relationships among three weirs located on the upper reaches of the Oos River. The map in figure 2.1 shows the location of the weirs that provide water for farmers from the villages of Taro, Bresela, Bukian, Kliki, and Klutug. Furthest upstream after the tiny weir of Taro kaja is the Taro irrigation system, which contains seven *subak*s and 162 hectares of rice

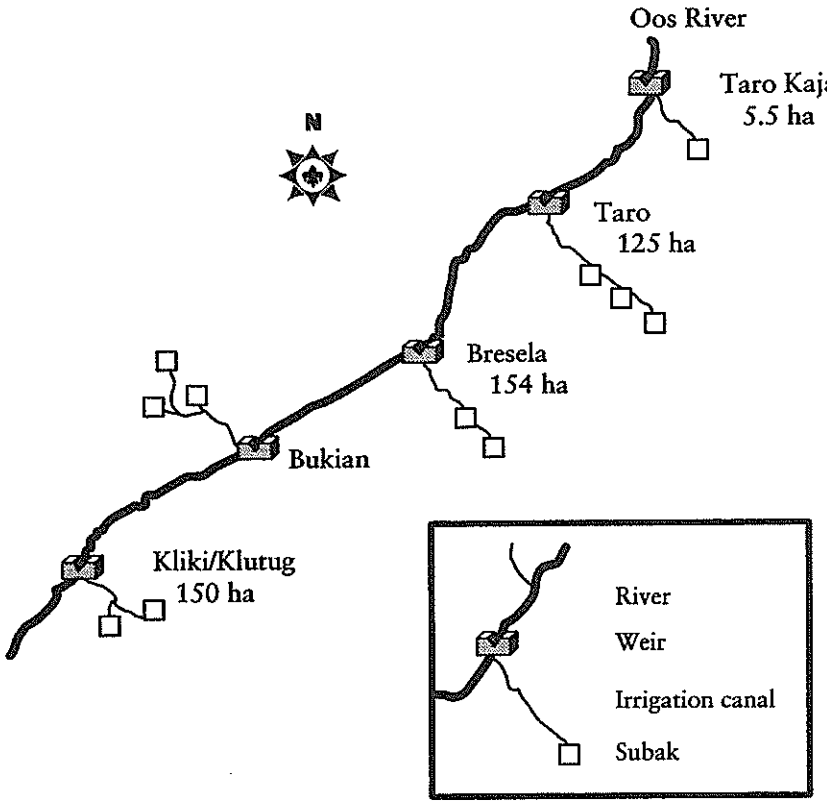


Figure 2.1. Irrigation along the Upper East Fork of the Oos River

terraces. River flow and irrigation requirements for Taro are given in table 2.1.

The variation in the river flow is five-fold from January through August. During the rainy season (roughly November through April), the problem is not water shortage but overabundance: fields and irrigation works must be protected from damage by flooding. During the dry season, Taro usually has enough water. But if excess water is not returned to the irrigation system feeding the villages downstream, they may suffer a shortage during the dry season. As shown in table 2.2, there would be a shortage of irrigation water from May through July, were it not for the release from the Taro irrigation system.

Thus from May through August, the flow from the Bresela weir would be inadequate to meet the irrigation demands of Bresela without the surplus water released from the Taro *subaks* upstream. The same story is repeated downstream in the *subaks* of Kliki and Klutug, which receive an

TABLE 2.1
Taro Irrigation (flow × 10,000 m²)

Month	*Inflow*	*Actual Intakes*	*Irrigation Demand*
January	268	9.2	8.0
February	220	7.4	6.5
March	257	22.0	19.2
April	190	47.8	41.6
May	115	55.0	47.9
June	104	38.5	33.5
July	54	27.4	23.9
August	47	13.1	11.4
September	73	14.7	12.8
October	115	9.5	8.3
November	195	29.9	26.0
December	223	30.8	26.8
Totals	1,861	305.3	265.9

Source: Department of Public Works, Irrigation Division, Sangglah, Bali.

TABLE 2.2
Bresela Irrigation (flow × 10,000 m²)

Month	*Release from Taro Irrigation*	*Inflow from Bresela Weir*	*Total Flow*	*Irrigation Demand*	*Deficit*
January	258.9	112.5	317.4	13.1	0
February	212.2	92.2	304.4	10.6	0
March	234.8	111.7	346.5	31.6	0
April	142.0	79.7	221.7	68.1	0
May	60.3	48.5	108.8	78.6	−30.1
June	65.7	43.8	109.5	55.0	−11.2
July	26.5	22.7	49.2	39.3	−16.6
August	33.4	19.5	52.9	17.3	0
September	57.8	30.5	88.3	13.4	0
October	105.9	48.5	154.4	9.0	0
November	165.5	82.1	247.6	42.6	0
December	192.5	93.8	286.3	44.2	0

Source: Department of Public Works, Taro Irrigation Project in Taro, Gianyar, Bali.

important share of their water from Bresela (and thus indirectly from Taro).

The release from the Bresela weir is the principal component of the total flow for the irrigation systems of Kliki and Klutug. Altogether, four separate weirs provide irrigation for three villages, and there is also an

TABLE 2.3
Villages of Kliki and Klutug Irrigation (flow × 10,000 m²)

Month	*Release from Bresela*	*Inflow from Weir*	*Total Flow*
January	356.3	121.8	478.1
February	292.2	99.8	392.0
March	310.2	116.6	426.8
April	148.4	86.3	234.7
May	18.4	52.4	70.8
June	46.2	47.4	93.6
July	4.0	24.5	28.5
August	33.0	21.1	54.1
September	72.9	33.0	105.9
October	144.0	52.4	196.4
November	198.7	88.7	287.4
December	235.5	101.5	337.0

Source: Department of Public Works, Bali Irrigation Project.

intermediary weir between Bresela and Klutug, which provides water for three *subaks* lying on the opposite side of the river. Hydrological interdependency extends beyond individual *subaks* and weirs to include all of these irrigation systems.

WATER TEMPLES

By now it should come as no surprise that the social units that set cropping patterns and irrigation schedules are usually not individual *subaks* but regional water temples, like the Masceti temple, Er Jeruk, located in the rice terraces below the village of Sukawati. The village of Sukawati receives irrigation water from three dams on two rivers, the Oos and Petanu. In all three cases, the main irrigation canals irrigate other fields upstream before reaching the 403 hectares of terraces in the Sukawati terraces. The congregation of the Masceti temple includes thirteen small *subaks*, which are divided into three groups for the purpose of rotational irrigation.

The role of the temple is described by the head of the village, who is also a farmer.

VILLAGE HEAD: The Pura Er Jeruk is the largest temple hereabouts, that is, the temple whose congregation includes all the farmers of the village of Sukawati. Now below this temple there are also

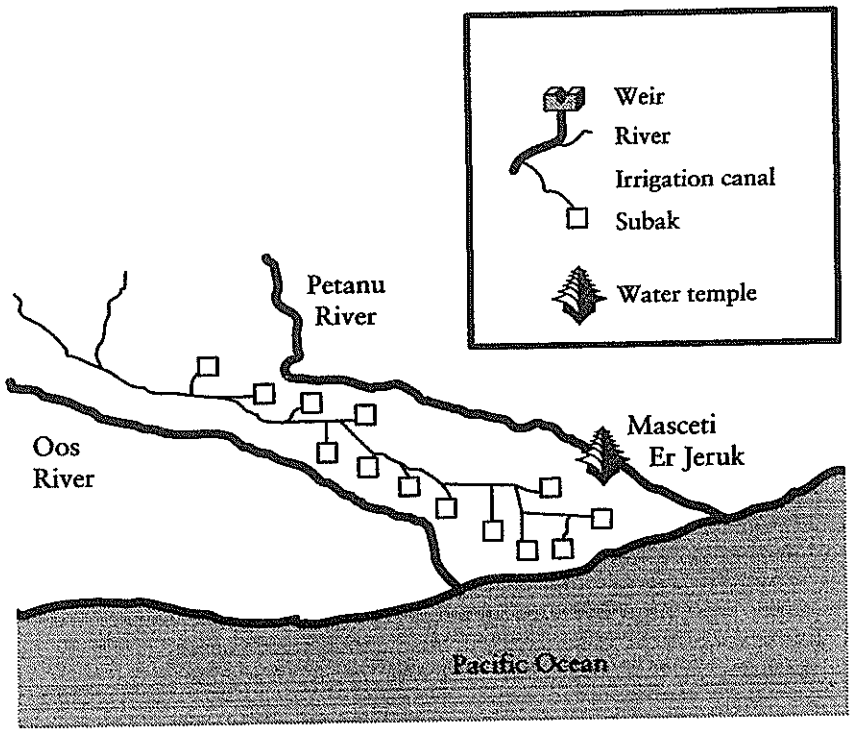


Figure 2.2. Sukawati Irrigation System

smaller temples, which are special places of worship for the *subaks*—each *subak* has its own. There are fourteen of these temples, fourteen *subaks*[11] all of which meet together as one here. They meet at the Temple Er Jeruk. Every decision, every rule concerning planting seasons and so forth, is always discussed here. Then, after the meeting here, decisions are carried down to each *subak*. The *subaks* each call all their members together: "In accord with the meetings we held at the Temple Er Jeruk, we must fix our planting dates, beginning on day one through day ten." For example, first *subak* Sango plants, then *subak* Somi, beginning from day ten through day twenty. Thus it is arranged, in accordance with water and *Padewasan*—that is, the best times to plant. Because here time controls everything. If there are many rodents and we go ahead and plant rice, obviously we'll get a miserable harvest. So we organize things like this: when the rodent population is large, we see to it that we don't plant things they can eat, so that they will all die—I mean, actually, that their numbers will be greatly reduced pretty quickly.

LANSING: Is there a fixed schedule of meetings?

VILLAGE HEAD: Once a year. Each new planting season, there is a meeting. If the planting schedule is not to be changed, there is no meeting. Of course, the ceremonies held here go on regardless—there are two temple festivals here, a one-day festival every six months, and a three-day festival every year. . . . This place is the home of the spirits of those who have preceded us, who built this temple—I would call this temple the fortress of the farmers hereabouts.

All three groups plant rice at least once a year in the rainy season. During the dry season, there is a rotational system. One group is guaranteed water for a second planting of rice, and one group plants a vegetable crop, receiving water once every five days. The third group will plant either rice or vegetables, depending upon whether the amount of irrigation water is judged adequate for rice. By setting the cropping pattern and irrigation schedule, the Masceti temple attempts to optimize water sharing while establishing a widespread fallow period to reduce pest infestations.

A slightly more complicated example is provided by the water temples of Kedewatan, located about midway up Mount Batur (see map 3). Here, seven *subak*s share water from a single large canal originating from a major weir nearly 4 kilometers upstream. Where the water first enters the terrace complex, there is a major temple called Ulun Swi (Head of the Ricefields). About 100 meters downstream from this temple, the main canal splits in two, and there is a Masceti temple alongside the upstream

TABLE 2.4
*Subak*s Attached to Masceti Temple Er Jeruk

*Subak*s	*Area (ha)*	*Members (1985)*
Abasan	31.66	96
Babakan	20.18	66
Bubun	38.41	120
Cau Beten	31.74	97
Cau Duwur	19.29	63
Juwak	33.35	99
Langge/Landep	34.49	62
Laud	34.92	84
Lebo	30.05	92
Palak	72.62	198
Sanga	36.28	108
Somi	20.93	65
Sungguhan	33.35	75

branch canal. A second Masceti temple is located about a half kilometer downstream, where the second branch canal enters the second set of terraces. The two Masceti temples form the congregation of the Ulun Swi Temple.

Each *subak* thus belongs to the congregation of the Ulun Swi and to one or the other of the Masceti temples:

The congregation of the Ulun Swi temple thus includes seven *subak*s with a total of 1,775 members, farming 558.04 hectares of ricefields. All *subak* members share equally in the responsibility to maintain the main

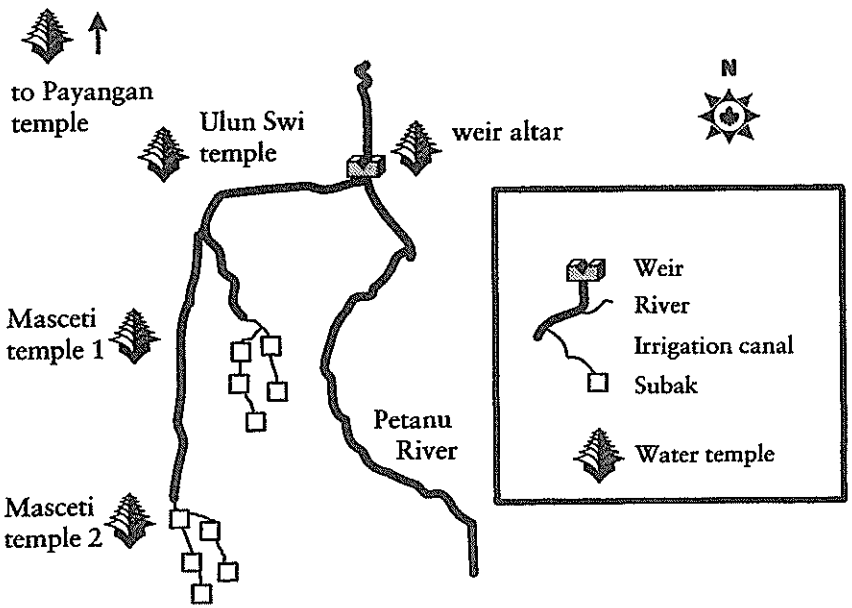


Figure 2.3. Kedewatan Irrigation System

TABLE 2.5
Water Temples of Kedewatan (Terraced area in hectares)

Ulun Swi Temple			
Masceti Temple #1 (first main canal)		*Masceti Temple #2 (second main canal)*	
Lungsiakan	54.82	Mas	38.74
Kibul Bebek	28.37	Sindhu Jiwa	94.59
Pacekan	133.41	Mandi	126.26
		Tebungkan	81.85
Subtotals	216.60		341.44

canal and weir. During the rainy season, the whole Ulun Swi unit plants the same variety of rice at the same time, ensuring a uniform fallow period after harvest to control pests.[12] For the second planting, each Masceti acts as a unit, choosing the crops to be planted and assigning rotational irrigation if needed. Each *subak* (or in the case of large *subak*s like Pacekan, each *tempek* unit) takes turns in both maintenance of the irrigation works and performing the annual rituals at the Masceti and Ulun Swi temples. Thus the practical management of irrigation is embedded within the hierarchical structure of the water temples.

SOCIAL CONTROL

We were concerned with two fundamental questions in this chapter: the kinds of managerial control required for wet-rice terraces in general and specific requirements for the management of irrigation along two Balinese rivers. Previous studies have assumed that the function of irrigation is simply to supplement rainfall. But as we have seen, in rice paddies water is used to construct an artificial pond ecosystem, which imposes far more stringent constraints on water management. The cycle of wet and dry phases governs the basic biochemistry of the paddy ecosystem, accounting for its extraordinary long-term productivity.

Along the Oos and Petanu rivers the monsoonal climate and rugged volcanic terrain create further constraints on irrigation control. A very few of the smallest *subak*s, located at the highest elevations, obtain all of their water directly from a single weir or spring and so are not obliged to cooperate with their neighbors in setting irrigation schedules. But the majority of the 172 *subak*s along these rivers depend on the release flow from upstream neighbors for an important fraction of their irrigation water. Hydrological interdependency is built into the very engineering structure of the irrigation systems, with long and fragile systems of weirs, tunnels, canals, and aqueducts threading their way down the mountainsides. Thus the physical constraints of Balinese irrigation require a system of control extending well beyond the *subak* level, connecting weir to weir and watershed to watershed.

The Balinese technique of pest control via coordinated fallow periods establishes a further set of constraints for water management. Even *subak*s that belong to separate irrigation systems may attempt to synchronize their harvests to minimize pests. This method, in turn, requires synchronized cropping patterns and irrigation schedules, which must balance the requirements of water sharing and pest control. For the fallowing system to have a real effect on pest populations, cropping patterns must be tightly synchronized over hundreds of hectares.

Altogether, it is clear that the productive process involves intricate systems of social control extending over hundreds, even thousands, of hectares of irrigated terraces. To evaluate the specific managerial functions of particular local hierarchies of water temple management is a complex question to which we will return in chapter 6 with the aid of a computer simulation model. But for the moment, other issues are more pressing. Although the temples play a practical role in irrigation management, they are essentially social and religious institutions, for as Condominas reminds us, agriculture is at once a social and a technical process. In chapter 3, we shift our attention from the technical effects of temple management to an exploration of their role in defining the productive process.

CHAPTER THREE

The Waters of Power

In *Negara: The Balinese Theatre State in the Nineteenth Century*, Clifford Geertz described the cult of divine kingship as the basis of power in traditional Balinese kingdoms, "The whole of the negara—court life, the traditions that organized it, the extractions that supported it, the privileges that accompanied it—was essentially directed towards defining what power was; and what power was was what kings were."[1]

The cult of divine kingship, as Geertz explained, claimed unlimited, godlike power for each ruler. A king must be a "universal monarch, the core and pivot of the universe." These claims were somewhat diluted by the sheer numbers of would-be divine monarchs who "dotted the landscape . . . each quite aware that he was not alone."[2] But in the rituals of his own royal cult—in the prayers spoken by his court priests—each king was, indeed, "what power was."

The subject of this chapter is a different constellation of powers that originate in the *erga* of the farmers and find expression in the rituals of water temples. For the most part, these powers lie outside the domain of politics, which also kept them from coming into focus for the Dutch, for whom the water temples remained lost in the hazy background of agricultural rituals and folk beliefs. Yet as we saw in the last chapter, the technical requirements for managing irrigation in Bali are anything but hazy. Now that we are somewhat acquainted with the nature of these requirements, it becomes possible to appreciate the kinds of controls and powers exerted by the water temples.

But to understand the role of water temples, it is necessary to begin with a more general appreciation of the relationship of temples to society in Bali. The key point is that all traditional Balinese social units, from households to kingdoms, possess their own altars or temples, where regular offerings are made to the gods concerned with their affairs—market gods in the market temple, village ancestors in the village temples. In other words, each social unit forms the congregation of a specific temple or shrine, which symbolically defines its place in the Balinese social universe. This principle has survived into the modern era, as banks, government offices, and even tourist hotels construct small temples on their grounds, which superficially establish their identity. However, modern institutions like office buildings have no immediately obvious relationship

to particular deities, and so it is difficult to know which gods should be invited to their festivals. If one examines these new-building temples more closely, it becomes clear that they are empty shells, and their very blankness serves to highlight the precisely defined symbolic roles of traditional Balinese temples.

For unlike all traditional Balinese temples, these new-building temples possess no shrines to particular deities. Instead, they typically include only a single shrine, a throne (*padmasana*) for the abstract deity Sang Hyang Widi. Until the arrival of Christian missionaries in the nineteenth century, Sang Hyang Widi was one of the most obscure and esoteric Balinese gods, a paradoxical concept of formless divinity to beguile Brahmanic theologians. The first Christian missionaries to Bali selected Sang Hyang Widi to represent the Christian God. But this proved to be a poor choice because in the context of Balinese polytheism Sang Hyang Widi is definable only negatively as the essence common to all the gods. Throughout the colonial era, the missionaries had little success with Sang Hyang Widi as a vehicle for Christianity. But after Indonesian independence in 1947, it became politically important for the Balinese to define their religion as *monotheistic*. In the effort to stave off Islamic proselytizers, Balinese theologians brought Sang Hyang Widi to the fore, this time as a Balinese equivalent of Allah. It was at this stage that shrines to Sang Hyang Widi began to be attached to new buildings, from tourist hotels to banks and government offices. These new temples may best be described as shrines to divinity in the abstract.

By contrast, all traditional Balinese temples consist of a collection of altars and shrines for specific deities, which express in a well-defined symbolic vocabulary the social role of the temple. For example, all Balinese markets have temples. The principal deity enshrined is Maya Sih, mistress of illusions, but there are also small shrines to other deities like the Rice Goddess. These shrines help situate markets in the meaningful context of Balinese cosmology, partly by articulating the link between the market temple and other temples elsewhere. Thus markets are not only places where the mistress of illusions holds dominion. They are also important to the Rice Mother in her specific incarnation as mistress of the "Head-of-the-Ricefields" temples. For although most rice goes directly from the fields to the rice barns, some is sold in the market before it reaches someone else's rice barn, and so the Rice Mother is obliged to take an interest in markets. Her shrines in the market temples are relatively minor, but they link the market temple to the "Head-of-the-Ricefields" temples and in this way help to define the significance of market activities.

In a similar way, every water temple has an array of shrines identified with a specific collection of anthropomorphic deities that expresses the social and cosmological role of the temple. This is precisely what the

shrines to Sang Hyang Widi in the new-building temples fail to do: to *read* the symbolism of the new-building temples is to read an empty page. In the language of Balinese ritual, a temple to Sang Hyang Widi fails to define any specific way in which the institution relates to society. Instead, on the anniversary of the building's completion, generic offerings are made to the generic deity, Sang Hyang Widi. In time, perhaps, Maya Sih (the mistress of illusions) or some other deity may find a new niche in the temples for banks or hotels. But for the present, banks remain unconnected to society—as it is defined by the symbolism of temple rituals.

I draw attention to this contrast because it helps to define what I would like to call the *sociogenic* aspects of water temple rituals. By this I mean that rituals at a water temple provide a deep reading of what the institution is about—its specific relationship to the social microcosm. Temple rituals literally call into existence the task groups that manage the terraces for economic production. These groups have no separate existence apart from the water temple system. In this sense, the temples provide a vehicle to achieve voluntary social cooperation in the management of the irrigation on which each village—and society as a whole—is utterly dependent. Each village obtains its water from a fragile weir and irrigation works that lie in the territory of other villages upstream. In the absence of a "hydraulic bureaucracy" to manage irrigation, the temple system itself must maintain a kind of "hydraulic solidarity," by persuasively articulating the common interest in watershed management. The symbolism of temple rituals is driven by a powerful logic, and it is to the principles of this logic that we now turn.

THE TEMPLE SYSTEM

Nadi tirtha-taya priye,
om tirtha-nadi ta kumbhas-ca

(River, dear because thou art Holy Water!
River of Holy Water, as well as receptacle)[3]

We begin with a simple equation: water temples define connections between productive groups and the components of the natural landscape that they seek to control. Each shrine or temple is associated with some particular component of the irrigated landscape. A local irrigation system begins with a spring, or, more often, a weir in a river, which diverts part or all of the flow of water to an irrigation canal. Beside each weir or spring is a shrine. The congregation of the weir shrine or spring shrine consists of all the farmers who use the water originating from this source. The principal deity to receive offerings at the weir shrine is called the

"Deity of the Weir" (*bhatara empelan*). Offerings are also made at the weir shrine to the Goddess of the Temple of the Crater Lake, who is said to make the rivers flow.

The irrigation canal that takes off from the weir eventually reaches a block of terraces. This spot is usually a kilometer or more downstream from the weir and is marked by a major water temple, the "Head of the Rice Terraces" temple (Pura Ulun Swi). The congregation of this temple is the same as that of the weir shrine: it consists of all farmers who grow rice in the terraces irrigated by this particular canal system. The principal deity of the Ulun Swi temple is called Ida Bhatara Pura Ulun Swi, the "Deity of the Ulun Swi Temple," whose influence extends to all of the terraces watered by the canal. The temple itself is simply a walled courtyard containing a shrine where farmers can make offerings to this deity. Additional shrines provide a place for offerings to other gods and goddesses, such as the Deity of the Weir and the Goddess of the Temple of the Crater Lake. These offerings at the Ulun Swi temple acknowledge the dependency of farmers on the flow of waters into their terraces, which in turn depends upon the flow at the weir and ultimately upon the flow in the river.

Other water temples and shrines follow a similar logic. All water temples are physically located at the upstream edge of whatever water system they purport to control. Chains of water temples articulate the hydrologic of each irrigation system. Temples and shrines are situated in such a way as to exert influence over each of the major physical components of the terrace ecosystems, including lakes, springs, rivers, weirs, major canals, blocks of irrigated terraces, *subak*s and individual fields. The temples link these physical features of the landscape to social units according to a logic of production: the congregation of each temple consists of the farmers who obtain water from the irrigation component *controlled* by the temple's god.

There are thus two aspects to the hydro-logic of irrigation dependency. The first is the link between a temple, its congregation, and the component of the ecosystem that it represents. Thus the Deity of the Weir dwells in the weir and requires offerings from every farmer who benefits from the water flowing through it. The weir is the origin of an irrigation system that has both physical and social components. The concept of an anthropomorphic "weir god" draws attention to the ways in which these components are related, for the weir is a man-made structure, a shared responsibility, which is also part of the physical landscape. For as long as the weir exists, a relationship of interdependency links the farmers who receive its waters. The weir shrine institutionalizes this relationship: particular farmers may come and go, but the social unit defined by the waters from the weir persists. Like the irrigation waters, this social unit originates at the weir. The concept of the weir god evokes this collective social

presence in the weir, where free-flowing river water becomes controlled irrigation water.

The idea of a collective presence leads to the second type of relationship expressed by water temple rituals: the interdependency of temples along an irrigation system. For example, the Deity of the Weir and the gods of other upstream water temples may be invited to descend into the Head of the Rice Terraces temple at the time of its major festival, to receive offerings. All water temples enclose an array of shrines and offerings platforms, in which homage may be offered to numerous deities. Because many of these deities are known by such names as "Deity of the Weir" or "Deity of the Masceti Temple," it is clear that they are essentially symbolic representations of other water temples. To do them honor is to acknowledge a relationship between the host temple and the temples of the gods they represent.

If one looks at the system from the bottom up, each farmer has a small shrine (*bedugul*) located at the spot where irrigation water first enters his fields. This "upstream" corner of his fields is considered sacred; it is here that he makes offerings to the Rice Goddess incarnate in his crop. At harvest time, the rice that grows closest to the water inlet is used to create a sacred image of the Rice Goddess herself, which is not eaten, but carried to the rice barn and given offerings.

Upstream from the farmer's field shrine, the next water temple is usually the *subak* temple, representing a block of irrigated terraces with a common water source. Several *subak*s make up the congregation of an Ulun Swi temple, associated with a large canal, and a weir or spring shrine. Several weirs typically form the congregation of a Masceti regional water temple. Finally, each spring, lake, and the headwaters of each river have shrines or temples. The largest water temple is furthest upstream—the Temple of the Crater Lake, associated with Lake Batur, which is considered to be the source of all irrigation waters within its river boundaries.[4]

At the downstream terminus of irrigation systems, important temples are located, which are classified as Masceti regional water temples. Upstream and downstream temples have very different functions associated with two different symbolic properties of water. Upstream water is associated with the nourishing, or life-giving, effects of water and is regarded as a gift from the Goddess of the Lake. In contrast, downstream water is cleansing water—water used to purify, to wash away pollution. It is not collected in sacred vessels, like upstream water, but is left running in the rivers. Impurities such as the ashes from sacrifices are thrown directly into the rivers, which bear them to the sea. This is the basis of a powerful symbolic contrast: whereas the waters high above in the crater lake rep-

ated with the equally potent mysteries of dissolution and regeneration. Downstream Masceti temples are located at the downstream edge of the last block of rice terraces irrigated by major rivers, along the sea coast. By the time they reach the sea, the rivers are considered to be brimming with impurities—the ashes of burnt sacrifices, the discharge from village and fields. The sea dissolves them all, removing their human content as impurities, and returning them to a wild, elemental, natural state.

SACRED WATER

om Apsu deva-pavitrani

(The gods in the waters are the purifying agents)

The hydro-logic of upstream and downstream dependency is imposed on the course of every river by the regional systems of water temples, which mark out the paths traced by the waters of the goddess as they simultaneously cause growth and cleanse the land of pollution. But the paths of the rivers are fixed, and there would be little point in a symbolism that could only reflect the unchanging logic of irrigation systems. Although the physical location of water temples suggests important clues about their meaning, the concept of "holy water" provides a vehicle to express more complex relations than simple irrigation dependency.

The importance of this concept for the Balinese is hinted by the very name of their religion: *Agama Tirtha*, "the religion of holy water." *Tirtha* (holy water) is the one indispensable element common to all Balinese rituals, not only those that take place at water temples. "*Matirtha*," the verbal form of the word for holy water, is the name for the culmination of every act of worship, in which—after one has concluded one's offerings and prayers—a blessing of holy water is sprinkled on one's head, and one drinks a few drops. Libations of *tirtha* are poured over offerings, sacrifices, buildings, and ricefields and into irrigation canals. Holy water fuses the symbolic qualities of upstream and downstream: it is at once a blessing and a purification.[5]

The sacredness recognized in these properties of water—its ability to cause growth and to purify and cleanse—derives in part from the human uses of water. It is only controlled water that can cause growth or bear away impurities. The particular potencies attributed to different varieties of holy water are symbolically associated with the original source of the water. Holy water must originate from an upstream source, and in most instances the more upstream a source is, the more potent the holy water that can be made from it. This appears to be a general principle true for

Fox has recently completed a detailed study of Pura Besakih, often described as the supreme temple of Bali.[6] The holy water for Besakih comes from several springs located above the temple on Mount Agung. According to Stuart-Fox, a simple rule governs the potency of these waters: the higher in elevation the spring, the more sacred are its waters.

We are thus led to ask, What is it about the quality of "upstreamness" that sanctifies water for the Balinese? The answer must surely begin with the relationship of farmers to upstream water. An example with which we are already familiar is the upstream source of irrigation water marked by a weir shrine. Here, "wild" flowing water becomes upstream irrigation water. As it enters the main canal, the flow is undivided. Downstream, it will encounter a series of water dividers that will ultimately channel it to individual fields and farmers. But upstream, at the weir, no one has yet laid claim to his portion of the flow. Thus although downstream water belongs to individuals, the undivided flow of water upstream at the weir belongs to the collective.

To create "holy water" at the weir, a cup of water drawn from the main canal at the weir is set at the foot of the weir shrine and offerings are made to the weir god, who is asked to sanctify the water. Although the water is physically removed from the canal, its upstream quality—its ability to signify the collective—remains intact, for it is now holy water. The ritual simply abstracts the qualities associated with the upstream flow of the weir—the association of the water with the social unit that originates from it. Henceforth, this holy water will be carefully labeled as to its origin and will always signify whatever qualities are associated with it as an upstream flow.

For this reason, holy water is regularly requested by downstream groups from upstream water temples. For example, holy water from the Bayad weir on the upper Petanu River is sought each year by farmers belonging to the Ulun Swi temple Celeng Patas (see map below), who mix it with holy water from their own temple.

The farmers of Celeng Patas obtain their irrigation water not from the Bayad weir but from the Manuaba weir. However, the Bayad weir lies directly upstream from the Manuaba weir, so the amount of water reaching the farmers of Celeng Patas largely depends on the release from the Bayad weir. Thus, holy water from the Bayad weir shrine is of great significance to the congregation of the Celeng Patas temple. Each year, a delegation from the Celeng Patas temple ascends the river to the Bayad weir altar, where a Bayad *subak* priest receives their offerings and prepares the holy water for them. Returning to their temple, they mix the Bayad holy water with the waters from their own temple and sprinkle it over their offerings, as a token of the blessing of the god of the Bayad weir. But holy water from the Bayad weir altar would have no interest or

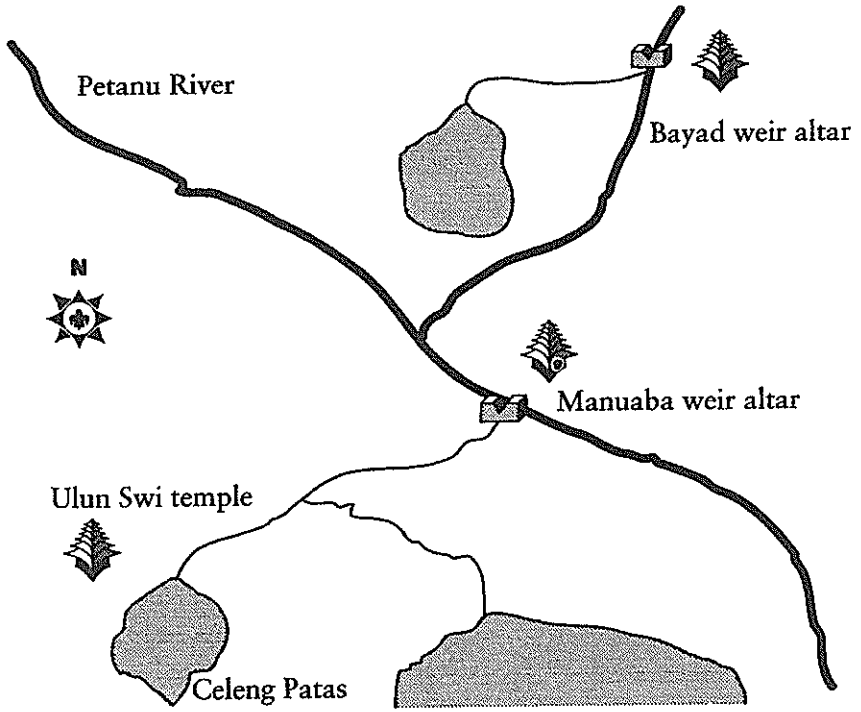


Figure 3.1. Holy Water for Celeng Patas Comes from Two Weir Altars: Bayad and Manuaba

Each temple has its own unique holy water, which signifies the temple, its god, and its congregation. In other words, each temple defines a social unit that is also signified by the holy water created in the temple. Holy water is thus like the temple's god but with the additional significance attached to the idea of upstream as origin. The most sacred variety of holy water, called *Bhatara Tirtha* ("Deified holy water"), is so imbued with the essence of the god that it is treated like a god and may represent the god who created it at rituals outside his temple. It should be emphasized that "holy water" does not signify society—or the sacred—in general but the specific social unit for which it is the upstream source.

Holy water thus provides a vehicle for symbolizing several types of social relationships. First, it establishes a means to define social groups by invoking their origins. The higher upstream one goes, the larger the social unit that may be drawn together by the waters. There is an origin for each level of an irrigation system, all the way up to Lake Batur and its Temple of the Crater Lake, the ultimate origin of everyone's water. Second, relationships between temples—and their congregations, the social units they

customary to send delegations to request holy water from several temples for major rituals. The water is carried back in sacred vessels, each clearly identified with the name of the temple whose blessing it conveys. These waters are then poured into a common container, thereby combining the blessings of several temples and their gods into an elixir to sprinkle on the worshippers attending the festival.

Thus the *flow* of holy water from temple to temple establishes hierarchical relations between the temples and links them to a common origin. Perhaps the most dramatic illustration of this process occurs every year in the preparation of holy water for the farmer's fields for the "pregnancy of the rice" offerings at the end of the rainy season. The process begins at the Temple of the Crater Lake, the supreme water temple, on the rim of the volcano. In the early morning a few days before the beginning of the Ritual of the Tenth Month, a delegation of priests ascends the cone of the volcano to the summit, where steam issues from vents in the rock. While the delegation performs prayers and offerings to "request holy water" (*panuhur tirtha*), the senior priest collects droplets of water hanging from the rocks, which have condensed from the uprising steam. This water is then taken down to the temple, where it is mixed with holy water from the eleven springs around the lake. Later, during the Rituals of the Tenth Month, this holy water is distributed to delegations from over two hundred *subak*s. Each of the *subak*s brings a sacred vessel into which is poured about 1 liter of holy water. The *subak*s carry the water home and mix it with the waters of their regional water temples. Finally, it is taken to the *subak* temples and distributed to individual farmers, who sprinkle it at the upstream edge of their fields. In this way, each farmer and field is symbolically linked to the entire hierarchy of temples and water sources.

The concept of holy water is inseparably linked to hierarchy because holy water never flows upstream (the waters of lower-ranking temples are never sought for the rituals of temples higher up in the hierarchy). It is important to distinguish between the metaphors of hierarchy created by the *flow* of holy water and the hydro-logic of irrigation dependency created by the actual flow of irrigation water. This difference is clearly illustrated by the role of holy water in kinship temples, where hydro-logic plays no role. Kinship temples are not water temples, but, nonetheless, every temple has its own specific source of upstream water used to create the temple's holy water. Often, this is a well or spring. Similarly, each family maintains a domestic supply of holy water, usually obtained from a priest, which is used almost daily in small offerings at the household shrine. For more important ceremonies at the family ancestor shrine, it is preferable to augment this water with holy water from the local clan temple, if one exists.[7] In this way, the blessings of more distant ancestors are added to those of the household shrine. Similarly, for a major ritual at the

the islandwide clan origin temple. For, like the drops of condensed volcanic steam from the Temple of the Crater Lake, the holy waters of a clan origin temple evoke the sacred origins of the collective.

THE GODS

These are the gods of Bali, written by Sang Mpu Kuturan . . . first is the god who reigns in the Ulun Swi temple, who cares for the life in the rice terraces

(*Dewa Tattwa* [History of the gods]
Ida Pedanda Made, Icaka 1865)[8]

Before proceeding further, we need to draw several threads of the argument together. Earlier, I suggested that water temple rituals articulate links between temples in the watershed, so the ritual system encompasses all the temples along a river. It was necessary to emphasize this point because prior studies of Balinese rituals have generally assumed that the symbolism of temple rituals is bounded by the temple walls. Instead, we have seen that ritual symbolism is deeply concerned with relationships between temples. We might, therefore, conclude that the proper level of analysis is not the individual temple or *subak* but the system of temples along a river.

From the standpoint of the role of temples in irrigation management, it does make sense to think of a system of control that extends along the entire watershed. It is also true that some temple rituals express this idea. Thus the flow of holy water from the Temple of the Crater Lake through the hierarchy of water temples or the annual offerings at the seaside Masceti temples convey an image of a water control system extending along the length of the river. But there is a problem with proceeding at this level of analysis, a problem that may appear to be merely a matter of emphasis but in fact relates to the essential meaning of the ritual system. The point is that regional water temples do not define themselves as local branches of a wider system. Instead, each temple is at the center of its own microcosm. Surrounded by a different constellation of social institutions, each temple honors its own specific collection of gods.

Offerings to these gods and libations of holy water define each water temple's social identity and its place in the overall hierarchy. The symbolism is usually quite clear and explicit. Consider, for example, the Ulun Swi ("Head of the terraces") temple Celeng Patas mentioned earlier as a temple whose congregation seeks holy water from their upstream neighbors at the Bayad weir. But the holy water from the Bayad weir is only

water of this Ulun Swi temple. The other sources of holy water for this temple provide a more complete symbolic map of the temple's position in the hierarchy of water temples. Celeng and Patas are both *subak*s, that receive their irrigation water from one of two irrigation canals fed by the Manuaba weir. The sister canal provides water for eight more *subak*s, and all ten *subak*s constitute the congregation of a Masceti temple associated with the flow from the Manuaba weir. These relationships are shown in figure 3.2.

The Celeng Patas Temple obtains its basic supply of upstream water to make holy water from a spring near the Petanu River. To this is added holy water from the following temples:

1. the spring for the Masceti Temple
2. the Bayad weir altar
3. the village temples (*kahyangan-tiga*) of Manuaba

We have already noted the symbolism attached to the waters from the Bayad weir shrine: the flow of waters to the Manuaba weir is directly

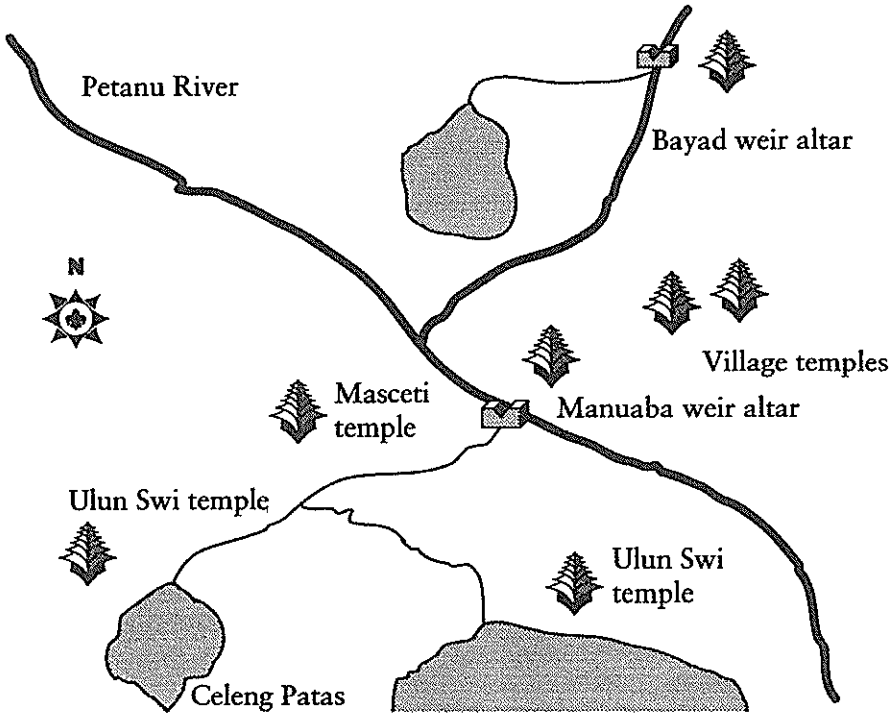


Figure 3.2. Additional Sources of Holy Water for the Ulun Swi Temple Celeng

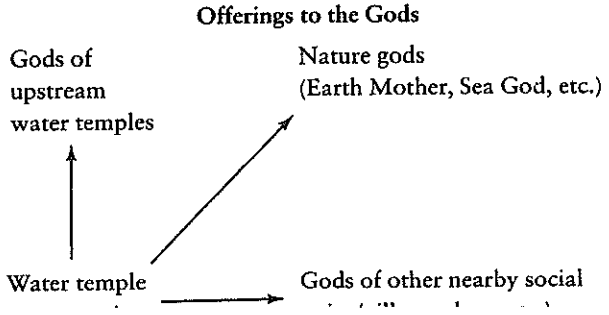
affected by the regulation of the Bayad weir. The relationship to the Masceti Temple is equally clear: the Ulun Swi Temple forms part of its congregation. Finally, the practice of augmenting the holy water of local water temples with holy water from the village temples is quite common. In this way, the interdependency of *subak*s and villages is expressed by mingling their waters. About once a generation, this relationship is given a fuller exposition in a ritual called *ngusaba desa* in which the deities of *subak* and village temples are jointly worshipped.

Holy water creates one set of symbolic connections; offerings to the gods provide another. During the festival of the Ulun Swi Temple, the following deities are specifically invited to receive offerings from the congregation:

1. God of the Ulun Swi Temple itself
2. God of the Masceti Temple of Manuaba
3. God of the Manuaba weir
4. Goddess of the Temple of the Crater Lake
5. Gods of the village temples of Manuaba
6. God of the origin temple for the Manuaba lineage of Brahmans, an islandwide kinship origin temple
7. Lord Protector of the Earth (Ratu Ngurah)

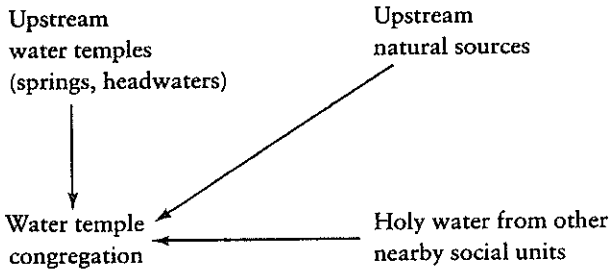
The first four gods articulate the local hierarchy of water temples. The fifth reaffirms the interdependency of *subak*s and villages. The sixth temple is very well known and important, as the origin temple for a senior Brahmana descent group. It is located a few hundred meters downstream from the Ulun Swi Temple, on a promontory overlooking the river and the rice terraces watered by the Ulun Swi Temple. Legend links one of the ancestors of the Brahmans to the creation of the Manuaba weir. The last deity is Ratu Ngurah, the Lord Protector of the Earth, who may be invoked to guard the territory of the Ulun Swi Temple.[9]

Thus the symbolism of offerings establishes a temple congregation's place in the local hierarchy of water temples and also links the temple laterally to other nearby social institutions, such as village or kinship temples.



Similarly, holy water symbolizes lateral relationships between different types of temples, as well as hierarchical relationships between water temples.

Sources of Holy Water



Offerings and holy water thus define the hierarchical relationships between water temples and the relationship of each temple to its local environment. Clear patterns emerge if we compare the symbolism of strictly regional temples to higher-level temples with larger and more inclusive congregations. For example, offerings to nature gods are seldom made at the smaller water temples but are reserved for the largest Masceti temples. Great gods are worshipped in great temples, lesser gods in local temples. This delineation appears to be in keeping with the general principle that the constellation of gods worshipped at each temple is related to that temple's social role, for the Sea God is not a local concern—he is a concern of the wider society represented by the higher-level temples.

To see the wider links established by water temples, we must move higher in the hierarchy, to the larger Masceti temples. Although these temples are also known as *Masceti*, they play a more universal role than those we have just considered and may be regarded as a different type. The two most important water temples along the Oos and Petanu are the Masceti temples of Pamos Apuh and Er Jeruk. They are, respectively, the farthest upstream and downstream Masceti temples along the Petanu and occupy a higher position in the water temple hierarchy than the other Masceti temples of this river. They differ from the other regional water temples of the Petanu in several important respects.

1. No offerings are made to the deities of the local village temples (*kahyangan-tiga*). Instead, offerings are made to several of the deities of the half-dozen supreme temples of the island. These temples, like Besakih and Batur, are often described as performing the same protective functions for the entire island that the kahyangan-tiga temples provide for a village. These temples are associated with the supreme gods and goddesses of the Balinese pantheon.

2. The offerings at temples like the Ulun Swi Celong Petes are addressed primarily to local deities. But at the major Masceti temples, offerings are also made to generalized nature gods, such as the Earth Mother and the Sea God.

3. In both of the major Masceti temples, the most elaborate offerings are given to the same three deities: the Deity of Mount Agung, the Goddess of Lake Batur, and the deity of the respective Masceti temple.

Both of these Masceti temples receive delegations from a much larger group than their immediate congregation of *subak*s. *Subak*s and water temples along the entire upper third reach of the Petanu offer *soewinih* contributions to the Masceti Pamos Apuh, which supplement the offerings of the fifteen *subak*s that form the temple's primary congregation. Similarly, the Masceti Er Jeruk is the proper site for offerings to placate the dangerous powers emanating from downstream (*kelod*), such as the Great Fanged Lord of the offshore islet Nusa Penida. The defense of the realm is the responsibility of kings, and so the deity of the Masceti Er Jeruk is a royal divinity, identified with the supreme gods of the island and attended by a divinized *sedahan* and scribe. Complete lists of deities receiving offerings at these two temples are as follows:

Both Temples

1. The Goddess of the Temple of the Crater Lake
2. The God of Mount Agung (and of the Temple of Besakih)
3. The deity of the Masceti temple itself

Masceti Temple Pamos Apuh

1. Tripurusa (the Hindu godhead, represented in abstract and generalized form)
2. The *sedahan* or major-domo for the deity of the Masceti temple, itself a god
3. The Grand Scribe, who like the *sedahan* assists the deity of the temple.
4. The Deity of Sakenan Temple (the most important seaside Masceti temple of Badung, who is associated with the control of malevolent powers emanating from downstream)
5. The Deity of the Head of the Ricefields (Ulun Swi) temples, which form the congregation of the Masceti temple
6. The Lord Protector of the Earth, a benevolent deity who protects the territory of the Masceti temple[10]

Masceti Temple Er Jeruk

1. The Earth Mother
2. The Sea God
3. The Deity of Ulu Watu, a seaside temple associated with the defense of the whole island against downstream demonic powers, similar to Sakenan Temple.

4. The deity of the *subak* ricefield temples, which form the congregation of this Masceti (there are no Ulun Swi temples in the cluster of temples associated with this Masceti).

5. The Great Fanged Lord, the demon-king of the offshore island of Nusa Penida, who is believed to send plagues, armies of demons, and ghostly soldiers to invade Bali, especially in the eighth month.[11]

The logic that dictates that wider conceptions of society are increasingly undifferentiated means that the highest-ranking Masceti temples inevitably transcend their roles as local water temples. As a regional water temple, the Masceti Er Jeruk sets irrigation schedules for its local congregation of *subak*s. But as guardian of the terraces and protector of the kingdom against malignant forces from the sea, the temple's potential congregation includes the whole of the realm. The ritual system is concerned not only with the temple's irrigation functions but with its wider role in the relationship between the social and natural worlds.

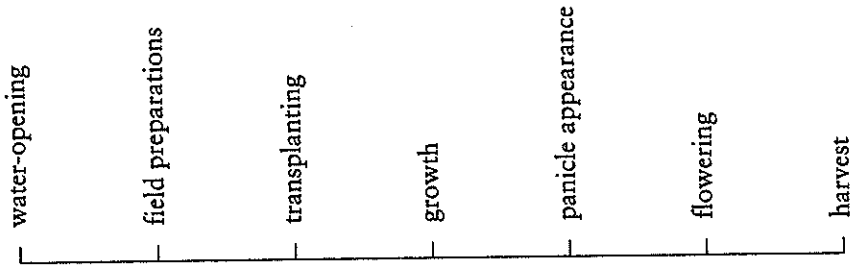
To define this wider role requires us to consider a further dimension of the ritual system: the symbolism of time. It has often been argued, most eloquently by Claude Lévi-Strauss, that time is the enemy of systems of symbolic classification such as those of the water temples.[12] According to Lévi-Strauss, ritual classification systems are always in danger of being washed away by the river of time. Time, in this sense, means change. But in the Balinese case, this argument does not hold, for time itself is thought to impose an order on the world. Balinese calendars define time not as a linear flow but as a structure composed of many interlocking cycles, based on the rhythms of growth of the natural and social worlds. The flow of time defines abstract patterns of order, which add a further dimension of meaning to the ritual system.

TEMPORAL CYCLES

> The God of the Masceti temple, who controls the rats, must be given offerings and the God of Sakenan Temple, who controls grasshoppers, should be given offerings. If there is a problem at the weir, perform the balik sumpah ritual at the Ulun Swi temple.
>
> (*Dewa Tattwa* [History of the Gods]
> Ida Pedanda Made, Icaka 1865)

For every Balinese farmer, the agricultural year includes a sequence of field rituals. Some are carried out in a little temporary shrine at the upstream corner of the farmer's fields; others involve offerings to various water temples. If we translate the names of these rituals, they appear to be keyed to the growth of the plants: "Water-opening"; "Transplanting"; "Flowering of the Plants"; "Harvest." The precise order of these rituals tends to vary slightly from village to village,[13] but a typical sequence goes like this:

Agricultural Rites in Linear Order



In any particular field, these rites appear to follow in a simple linear progression, marking the stages of growth of the rice plants. But in reality a single event, such as panicle appearance, may involve half a dozen water temples and two calendars. And "water-opening" ceremonies actually occur on several different calendrical cycles at different levels of the temple hierarchy. But because some "water-opening" ceremony inevitably precedes any field preparation, an observer watching the ritual sequence in a single field may erroneously conclude that one ritual simply follows the next, as "b" follows "a."

Of course, rice plants do grow linearly, and the panicle will infallibly appear at the end of the vegetative growth phase. But for panicle appearance to occur on schedule over hundreds of hectares of rice terraces, many water temples must coordinate their activities. By tracing the actual sequence of rituals, it becomes evident that the real subject of the ritual process is not the rice plants but the relationships between productive units in the water temple system. An example is provided by the Kedewatan irrigation system, which we first encountered in chapter 2.

This set of water temples begins a new productive cycle about once every ten years, with the "opening of the waters" (*mapag toyo*) ceremony at the Ulun Swi Temple. The date for this ritual is not predetermined. Instead, the process of setting the date and holding the ritual draws together all of the farmers who receive water from the same weir, a total of ten *subak*s that form the congregation of the Ulun Swi Temple.

The ceremony itself takes place at an altar that stands next to the weir, about 4 kilometers upstream from the rice terraces. This ritual activates the complete network of ten *subak*s, defines it as a productive and ritual

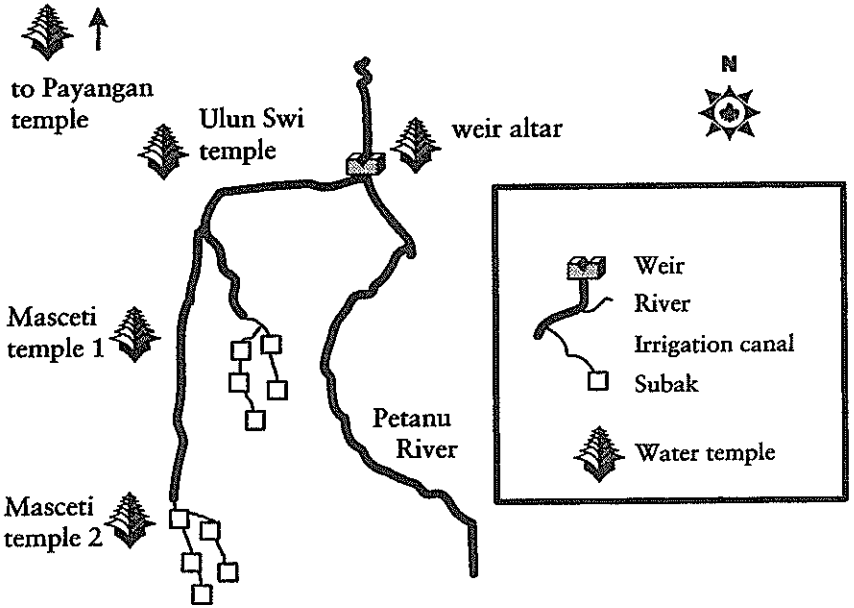


Figure 3.3. Kedewatan Irrigation System

unit, and establishes its relationship to the overall hierarchy of water temples and irrigation control. In the diagram, the main canal enters the terraces from the north. The Ulun Swi ("Head of the Ricefields") Temple is situated where the canal divides in two, just above the first set of terraces. On the chosen date, representatives from each *subak* bring their offerings to the Ulun Swi Temple. Using incense and prayers, the temple priest invites two deities to descend into the temple and join the god of the temple in accepting the feast that has been prepared for them. The two visiting deities are the Goddess of the Lake (Dewi Danu), the principal deity of the Temple of the Crater Lake, and the "Deity of the Masceti Temple of Payangan" (Ida Bhatara Masceti Payangan). The Masceti Temple of Payangan is the focal point for a regional cluster of *subak*s upstream from the Ulun Swi Temple, whose cropping patterns directly influence the water flow to the Ulun Swi Temple. Meanwhile, a small party made up of representatives of the ten *subak*s follow the main irrigation canal upstream to the altar that stands by the river weir and lay out more "deity offerings" for the god of the weir, the Goddess of the Lake, and the gods of the Masceti temples. At the climax of this rite, holy water from the Temple of the Crater Lake is poured directly into the entrance gate of the main canal. In this way, about once a decade, the ten *subak*s acknowledge their collective reliance on the weir, their neighbors upstream at the Payangan water temple, and the Temple of the Crater Lake by joining the symbolic flow of holy water with the flow of irrigation water at the weir.

The congregation of the Ulun Swi Temple consists of two Masceti temples, each of which sets the planting schedule for five *subak*s. The Masceti cycles begin with a ceremony called *muat emping*: offerings to the Earth Mother (Bhatari Pretiwi). *Muat emping* is performed when irrigation water reaches the fields, and the first annual rice planting is about to commence. The offerings to the Earth Mother are first dedicated at the Masceti temple at the beginning of the cultivation cycle and then distributed at the upstream corner of each farmer's fields.[14]

Field preparation is followed by *nuasen*, which marks the transplanting of rice seedlings into the fields. As *Mapag toyo* began the master cycle of the Ulun Swi Temple and *muat emping* initiated the Masceti cycles and the flooding of the terraces, *nuasen* begins the microcycles of individual *subak*s and farmers. In consultations at the Masceti temple, each of the five *subak*s sets a seven-day window for its members to perform *nuasen*, which must be coordinated with the flooding of the terraces. Each farmer must then determine the proper date on which to perform *nuasen* offerings at his field altar, which will set his own personal calendar for his field: it becomes "day one" for that particular rice crop, the beginning of a unique cycle. Months later, when he harvests the rice the farmer must perform the harvest ritual on the same date as *nuasen*. In effect, the growth cycle of a farmer's crop is timed to an accuracy of a single day. The cultivation cycle of the *subak* represents the aggregate of all of these individual cycles, which are tracked on a unique calendar called a *tika*. Plotted on the *tika*, the sum of all the individual cultivation cycles of the farmers equals the *subak* cycle. In a similar way, the aggregate of *subak* cycles equals the cycle of a Masceti, or an Ulun Swi. The structure of the temple hierarchy is embedded in these calendrical cycles, which equate longer cycles with larger and more comprehensive productive units.

This concept of large cycles encompassing many smaller ones has an interesting analogy in the composition of Balinese music. In a Balinese gamelan orchestra, small instruments play short, repetitive cyclical patterns. Larger instruments play at longer intervals, defining the beginnings and endings of melodies. All musical compositions are based on interlocking cyclical patterns, with long sections defined by the sounding of large gongs. In a similar way, high-ranking water temples are thought to encompass the activities of smaller ones, meshing many separate cycles into a single productive sequence.[15]

The *tika*, which defines time as composed of interlocking cycles, is one of two calendars used by the Balinese. The other is a luni-solar calendar, which enables the user to keep track of linear time—the progression of months and years. But the *tika* calendar is a different mathematical in-

strument used to keep track of many different intervals at once. Physically, a *tika* is a wooden or painted calendar that lays out a grid of thirty seven-day weeks. Each of the weeks is named, and any farmer can reel off the names of the weeks from memory.

But this is only the first and simplest classification of time portrayed by the *tika*. In addition to these thirty, seven-day weeks, the *tika* also keeps track of nine other weeks, with varying durations. Thus, there is also a three-day week, consisting of three named days: *Pasah, Beteng*, and *Kajeng*. The three-day week is concurrent with the seven-day week, so that if today is Sunday on the seven-day week, it is also *Pasah, Beteng*, or *Kajeng* on the three-day week. A symbolic notation (dots, lines, crosses,

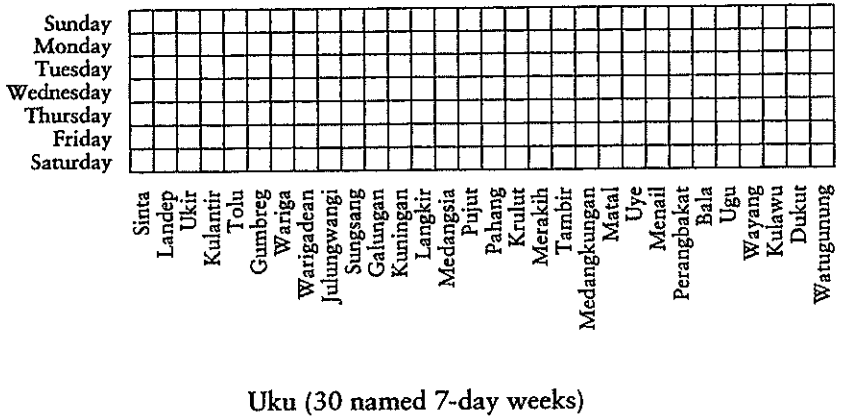


Figure 3.4. The Tika Calendar

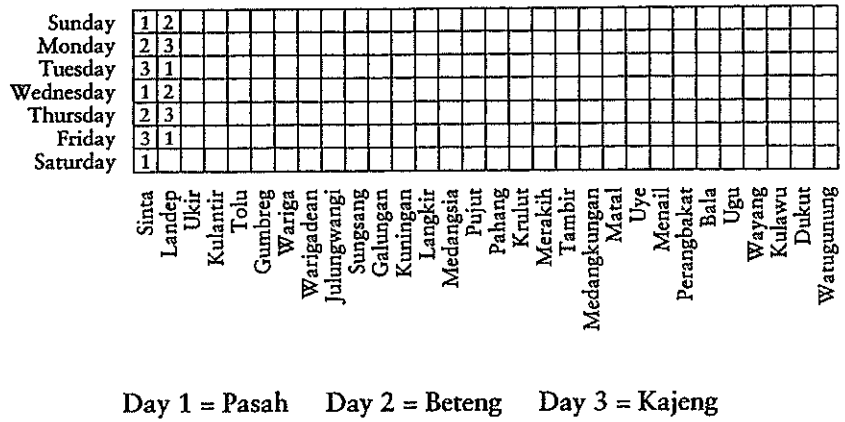


Figure 3.5. The Three-day Week Superimposed on the Tika

etc.) is used to superimpose the days of the three-day week on the grid of seven-day weeks displayed on the *tika*.

In addition to the seven-day week and the three-day week, there are also eight other weeks that vary in duration from one to ten days. For example, the one-day week consists of a single day, *Luang*, whereas the ten-day week consists of ten named days: *Pandita, Pati, Suka, Duka, Cri, Manuh, Manusa, Raja, Dewa, Raksasa*. The symbols inscribed on the *tika* enable the user to keep track of all ten concurrent weeks. Thus the first cell in the *tika* (Sunday in the week of *Landep*) is also the first day in the three-day week, the second day in the five-day week, the third day in the eight-day week, and so on.

If all these day-names were included on every cell, the calendar would become impossibly crowded. Instead, the symbolic notation permits a knowledgeable user to identify all ten day-names for any given date. For the farmers, however, the more important uses of the *tika* have to do with the timing of longer intervals. The symbols used to mark the days of the weeks emphasize the longer intervals defined by the intersections of cycles. For example, on the second day of the second week (*Landep*), the third day of the three-day week (*Kajeng*) falls on the fifth day of the five-day week (*Kliwon*). This conjunction of cycles occurs once every fifteen days, and is marked with a special symbol. Similarly, the conjunction of dates on the five- and seven-day weeks mark out thirty-five-day intervals, basic for the scheduling of many activities. Because the *tika* is independent of the seasons, it has no particular starting or stopping date. Starting from any given date, the *tika* helps mark out multiple intervals of any

1-day week:	vacant	
2-day week:	Menge	day 1
3-day week:	Pasah	day 1
4-day week:	Sri	day 1
5-day week:	Kliwon	day 2
6-day week:	Tungleh	day 1
7-day week:	Redite	day 1
8-day week:	Sri	day 1
9-day week:	Dangu	day 1
10-day week:	Sri	day 4

1-day week:	Luang	day 1
2-day week:	Pepet	day 2
3-day week:	Beteng	etc.

Figure 3.6. The First Day in the Tika Calendar

desired length up to 210 days, the growth duration of old Balinese rice (*padi del*).[16]

The principal practical use of the *tika* for the farmers is to synchronize concurrent production cycles, which may be of different lengths. Consider the complexity of timing water use and planting cycles for a productive system like the fifteen *subak*s of the Masceti temple Pamos Apuh. During the dry season, there is usually a need for rotational irrigation. A particular block of terraces may be flooded on a certain date for a specified number of weeks depending on the crop. Later, the flow may be reduced when the ground beneath the plow pan becomes saturated. Perhaps another block of terraces is scheduled to grow vegetables for a 105-day cycle and should receive irrigation water every third day of the five-day week during this 105-day interval. By using the *tika*, multiple concurrent cycles can be specified with ease and precision, with the assurance that they will mesh neatly together, synchronizing the labors of thousands of farmers.

The *tika* is a powerful instrument for calculating the orderly patterns of temporal succession. The social and natural worlds are defined as composed of many parts, all of which may be growing or changing at different rates. In the water temples, the uses of the *tika* extend beyond the synchronization of productive schedules, to structure the hierarchy of productive relationships. The personal growing cycles of individual farmers are aggregated into the cycles of the *subak*, weir, Ulun Swi and Masceti temples, and ultimately into the annual cycles of the Temple of the Crater Lake, which will be described in chapter 4. In this way, the productive process is defined as a hierarchical structure that emerges through the synchronization of the farmer's labors.

This wheels-within-wheels view of time assigns different ranks to different water temples, based on their role in the productive system. The highest rank belongs to major water temples, which control productive cycles for whole sections of rivers and blocks of terraces. Lesser temples control smaller cycles, involving smaller congregations of farmers. These differences in rank are symbolically marked by the architecture of temple shrines. All water temples include shrines called *meru*, named for the mythical Mount Meru, the sacred mountain at the center of the world. As Mount Meru is the home of the gods, so the *meru* shrines in temples are temporary homes for the gods during temple festivals. *Meru* are black wooden towers, with tiers of from one to eleven pagoda-like roofs (*tumpang*) rising above a central chamber. The higher the tower, the higher the rank of the god within. Whereas ordinary field shrines are usually single-storied, important Masceti temples may boast seven- or even nine-storied *meru* towers, signaling that they are of princely rank. For example, the god of the Masceti temple Pamos Apuh, controlling the productive cycles

of dozens of lesser temples and thousands of farmers, is a five-storied god; whereas ordinary *subak* temples usually contain only three-storied *meru*. In general, the *meru* rank of a water temple depends on the scope of its productive role as defined by the hierarchy of productive cycles.

This ranking of temples by the height of their *meru* towers is not confined to the water temples but extends to all Balinese temples. We began this chapter with the observation that all Balinese social institutions build temples. Interestingly, there are no visible symbols that distinguish one type of temple from another. Instead, the symbolism of temple architecture has the opposite effect: the rank of all types of temples is expressed by the height of their *meru* towers.

If the hierarchical rank of water temples depends on their productive role, What determines the ranking of other types of temples? An example of another temple hierarchy, whose relevance to water temples will become apparent in a moment, is the set of temples that mark the rankings of descent groups in the Balinese version of the caste system. All Balinese are born into descent groups with caste rankings, which are proclaimed by the *meru* towers of household shrines to family ancestors. These household temples are found in the courtyard of every Balinese dwelling, instantly identifying the caste ranking of the inhabitants. Ancestor shrines for commoners may have from one to three *meru* roofs, high-caste aristocrats, five or more, with the highest rank of eleven roofs reserved for consecrated kings.[17] This symbolism of rank is especially important at the summit of the social hierarchy in the ancestor shrines of princes and kings. Because Balinese kingship was based on the principle of sacred descent, the *meru* towers of princes and kings defined their claims to power: a seven-storied princeling was outranked by a nine-storied rajah, both of whom were inferior in rank to an eleven-roof king. As Clifford Geertz observed in his study of Balinese kingship, the struggle of rival rajahs to achieve symbolic recognition as an "eleven-roof lord" defined the political arena of Balinese kingship; the dynastic struggles of the "theatre states": "The competition to be the center of centers, the axis of the world, was just that, a competition; and it was in the ability to stage productions of an eleven-roof scale, to mobilize the men, the resources, and, not least, the expertise, that made one an eleven-roof lord."[18]

In the context of the Balinese cult of divine kingship, the *meru* ranking of the shrine to the royal ancestors was a direct statement of a king's divine ancestry and, therefore, of his right to rule. The powers of kings were represented as a mandala of forces gathered around the royal shrine.

Thus the same image, an eleven-storied tower representing the cosmic mountain, served to represent the pinnacle of power for both the cult of divine kingship and the cult of water temples. But while kings base their claims to power on their divine ancestry, the powers of high-ranking wa-

ter temples derive from their control of productive cycles. Despite these different origins, both types of power are represented on a single hierarchical scale: the nine-storied *meru* of a rajah is identical to the nine-storied *meru* of a major Masceti temple. The tension between these two sources of power reaches a climax at the apex of the water temple system, in the eleven-storied Temple of the Crater Lake, the subject of chapter 4.

CHAPTER FOUR

The Temple of the Crater Lake

FROM anywhere in central Bali, farmers need only glance up to the clouds around Mount Batur to be reminded of the ultimate origin of the water flowing into their fields. In the crater of the volcano, at an elevation high above the height at which rice may be grown, is an immense freshwater lake, stretching over 1,718 hectares.[1] This reservoir is regarded as the ultimate source of water for the rivers and springs that provide irrigation water for the whole of central Bali. Temple priests describe the mountain lake as a sacred mandala of waters, fed by springs lying at each of the wind directions, high above the irrigated lands. The steam from the caldera of Mount Batur represents the zenith of the mandala; the nadir is found in the depths of the lake. Each of the springs around the lake is regarded as the origin of waters for a particular hydrological region of central Bali. Thus, farmers from the district of Tejakula, in northern Bali, seek their most precious holy water from the northern spring of the lake, called Reijang Anyar; whereas the Unda river in the south is thought to originate from the spring called Bantah Anyut.

The entire mandala of the lake forms the center of a much larger mandala, consisting of the island of Bali and the seas that surround it. Priests describe the lake as a freshwater ocean, filled with life-giving water, which contrasts with the salt ocean that encircles it far below. The lake is the home of one of the two supreme deities of Bali, the "Goddess of the Lake," Dewi Danu. Her relationship to the farmers of central Bali is succinctly defined in a manuscript kept in her temple, "Because the Goddess makes the waters flow, those who do not follow her laws may not possess her rice terraces."[2]

According to legend, the goddess and her male counterpart, the God of Mount Agung, emerged from an erupting volcano in the Icaka year 310.[3] Together with other, lesser gods, they took possession of the land and waters of Bali. The goddess rules the lake and Mount Batur, the second-highest peak in Bali, whereas the god rules Mount Agung. As the male and female deities of the two highest mountains, they form a complementary pair, the supreme gods of the island. The male god of Mount Agung is worshipped at the temple of Besakih, high on Mount Agung, and is symbolically associated with the king of Klungkung, who claims suprem-