The distribution of irrigation water among Subak members is based on the principle of ayahan. This is the right of the Subak members to make use of available water resources in exchange for ngayah or free communal work on Subak activities. All Subak members have the same right to irrigation water. The amount of water is computed by dividing the total amount of water available by the number of Subak members.

A Subak consists of all the landowners – or their representatives - in a particular rice production area. The Subak is not only responsible for the construction and maintenance of canals, tunnels, aqueducts and dams, and for the distribution of water, but also coordinates the planting and organisation of ritual offerings and festivals.

Community organisations called Subak control the water irrigation system to ensure reliable, fair and equitable distribution. Besides its technical functions, the Subak also provides social benefits including strengthening the possibilities of its members to maintain social contacts. This is reflected in the various communal activities undertaken in the form of task-oriented self-help groups (seka).

Community groups and group activities are traditionally very important in Balinese society. They reflect the significance attached in Hindu philosophy to the relationships an individual has with others members of society. This is a highly valued principal particularly in rural society.

Bali’s famous Subak system is one of the most vital components of Balinese society. Built over the course of several centuries, it remains an integral part of Balinese life and is a product of the island’s history and culture.

Subak
Irrigation is essential to Balinese agriculture because of the long dry season that extends from April to October. The elaborate system of channelling water from lakes, rivers and springs across countless sawahs is controlled by fully autonomous Subaks. Their engineering knowledge is sophisticated and the tunnels they build and maintain through the hills can be up to 3km long and 40m deep.
It is possible to distinguish three types of Subak members. Apart from the special members, such as Hindu priests, there are ‘active’ members, who carry out the essential work of maintaining the irrigation systems and ‘passive’ members who prefer to pay for maintenance. There are also two types of meetings: the more regular, short meetings where work is divided between the ‘active’ members and, only if necessary, general meetings to discuss more serious issues. All members are expected to attend these.

Why cooperation?
What is the basis for this widespread cooperation? It might be thought that upstream participants in this cooperative network would be less inclined to cooperate because cooperation means they would have to leave some water for the farmers downstream and therefore would not be able to use it all themselves. However, in the particular ecology of Balinese rice paddies the flow of irrigation water affects the population dynamics of rice pests. If fields are planted randomly, rice pests can easily move from one field to the next after harvest, allowing pest populations to escalate. By coordinating planting over a wide enough area, farmers can create large fallow spaces that prevent pests from migrating between food patches. In this way pest populations are kept small. The rather low incidence of pests and diseases in the rice might, however, also be attributed to other specific agricultural practises, such as the collective burning of rice straw, maintaining water layers on fields after harvest and herding ducks in harvested fields. Even ceremonial offerings have been identified as possible reasons for pests being lured or scared away.

In short, both upstream and downstream participants gain advantages from cooperating with each other. Pest damage is reduced upstream, while downstream farmers experience less water stress.

Collaboration
Officially there is no link between the Subaks and government institutions and the autonomy of Subaks is guaranteed by their legal status defined in local Balinese regulations. However, government agencies have sometimes tried to ‘use’ the existing Subak cooperatives for their own purposes. These have included agricultural extension, introduction of new rice varieties, as well as the provision of credit for chemical fertilisers. At one stage taxes were also collected through the Subak heads. Most of these government ‘intrusions’ have back-fired and the Subaks have proved their resilience by surviving these attempts to hijack the community groups for reasons other than their main objective: fair and equal provision of irrigation water to farmers.

Farmers see the Subak as their one and only agricultural organisation. Such aspects of their agriculture as planning the time when a new crop should be planted or the use of fertiliser, for example – can be dealt with through the Subak if there is a clear relation with the provision or use of irrigation water. A Subak, for instance, decides on the type of rice to be grown, depending on the amount of water that is expected to be available. In some cases, when there are signs of water shortages, a Subak can also decide, as a group, not to grow rice but to plant alternative crops (palawija) that are less water demanding.

Resilience
Irrigation water management by community organisations on Bali has proven to be effective, efficient and durable. The Subak system has adapted itself time and again over the last 1000 years. Any minor conflicts that have arisen have generally been effectively solved. This capacity to resolve problems is only one of the strengths of this system that is deeply rooted in Balinese traditions.

Subak organisation

- Sedahan Agung: the highest Subak institution, located at the office of regional income at district level. A Sedahan Agung is a regional government position with a regular government salary.
- Sedahan Yeh: similar to Sedahan Agung, but located at a lower hierarchy of a watershed of a river (yeh) in a district.
- Subak Gede: Subak organisation at a watershed ecosystem, socially organised, led by a sedahan or pekaseh gede, at sub-district level.
- Subak: water user organisation at a part of a watershed area, headed by a pekaseh and socially organised.
- Tempek: the lowest hierarchy of water user organisation at a planting area, led by a kelian. A tempek is usually an area with natural boundaries such as a creek, tall trees, rock outcrops, etc.
- Kerama: individual member of a Subak

Participation
Subaks are not societies for Balinese Hindu’s alone. Farmers of other religious beliefs living in the Subak areas may also participate in the system and those farming other people’s land are also included in the Subak system. Their ‘share-cropping’ contracts state who is responsible for paying Subak fees and this is usually the landowner.

References

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Women play an important role in Subak ceremonies. Photo: Rik Thijssen