



Ecology and Equity in Rights to Land and Water: A Study in South-Eastern Palakkad in Kerala

Jyothi Krishnan

Independent Researcher, Thrissur, Kerala, South India; jyothikr07@gmail.com

Abey George

Kerala Institute of Local Administration, Thrissur, India; abeygeorgek@gmail.com

ABSTRACT: This article explores the impact of the existing property rights regime over land and water on the sustainable and equitable management and use of these resources, in the context of changing irrigation practices in a paddy-growing area in the south-eastern part of the Palakkad district in Kerala, India. Since land rights determine rights to water in the area, the article discusses the changing rights regime over land, primarily after the implementation of land reforms in 1970. It shows how the implementation of land reforms and nationalization of private forests have paid little attention to the ecological context in which redistribution was taking place. As a result, while an agricultural-cum-forested landscape was divided into privately owned and government owned parcels, the ecological relationships between these different land use categories were ignored. In the same vein, land and water were treated as separate entities, with redistribution of land rights overlooking the distribution of water rights. The compartmentalized view of resources coupled with the consolidation of the private property regime has resulted in a situation where landowners exploit the resource without any consideration for its ecological characteristics and inter-resource linkages. The failure to view land and water in integration has precipitated inequitable access and unsustainable use of water. In addition, the availability of external water supplies and the introduction of energised pumping facilitate the enclosure of water within privately owned land parcels. The article concludes that a re-envisioning of rights to resources within the concerned ecological context is necessary if sustainable and equitable resource use and management are to be achieved.

KEYWORDS: Land rights, water rights, ecology, sustainability, Palakkad, Kerala, India

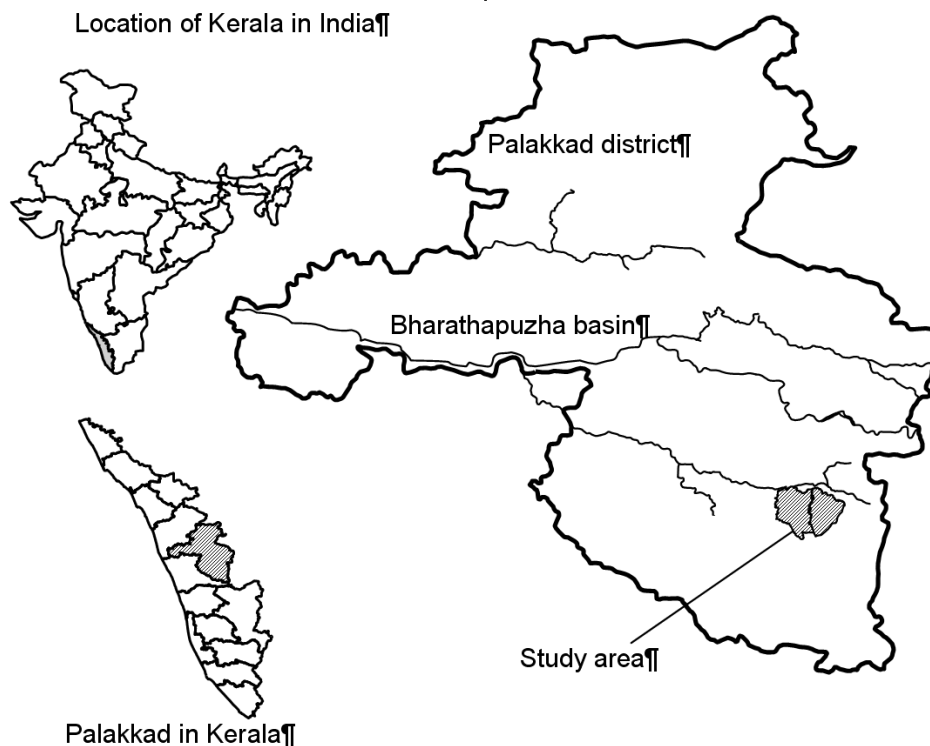
INTRODUCTION

Property rights regimes play an important role in determining the extent of access that individuals and communities exercise over natural resources. By granting access to the use of a resource without any consideration for its sustainable and prudent use, existing property rights regimes can threaten the long-term sustainability of the resource. This has been well illustrated in the case of groundwater, which is treated as a privately owned resource as a result of which it has suffered overexploitation in many parts of the world (Bhatia, 1992; Dubash, 2007). This article examines the way in which land and water rights have been framed in a paddy-growing pocket in the Palakkad district of the southern state of Kerala in India (see figure 1). The formulation of rights has paid little attention to the specific ecological properties of the resource, thereby sanctioning use patterns that are not cognisant of the needs of long-term ecological sustainability. Further, rights to land and water do not recognise the ecological interconnections between land and water as well as between different land types such as forest and agricultural land.

The prevailing trend of enclosing water within private land parcels contributes to the problem of water scarcity that many parts of Palakkad face today. Existing enclosures of water within wells and

ponds have much to do with the changes that have come about to the property rights regime over land and water in the area. The increasing unsustainable use of land, particularly paddy land, is also related to the changing land rights regime. The implementation of the land reforms and the nationalisation of private forests nearly four decades ago have been treated as a turning point in the current analysis.

Figure 1. Palakkad and Kerala.



Findings for this article were derived from a larger study conducted on the issue of water scarcity in the Palakkad district of Kerala, during the 2000-2002 period (Krishnan, 2007). The study was conducted in the Kollengode and Elavanchery panchayats of Chittur taluk located in the south-eastern part of the Palakkad district considered one of the rice bowls of the state of Kerala, which has been facing severe water scarcity during the past two decades. This region is a part of the Bharathapuzha river basin, one of the most degraded river basins in the state (Nair, 2004). This region also looks back at a long history of experimentation with irrigation, Kollengode being the panchayat with the largest number of traditional water-harvesting structures, known as *kulams* (ponds or tanks). Since the late 1960s, modern irrigation has made its presence felt with the introduction of reservoir-based canal irrigation.¹

Research findings are based on a qualitative survey that was undertaken to assess changing land and water management practices and their impact on the water scarcity problem. Areas explored include changing agricultural practices (changing cropping patterns in pond command areas, intensification of paddy), changing irrigation practices (changes brought about by the introduction of modern irrigation and its impact on traditional irrigation structures, changing patterns of water distribution) and the changing property rights regime that focused on the changes brought about by the implementation of the land reforms and the introduction of modern irrigation practices.

In order to assess the changing rights regime, farmers from all landholding categories were represented in the survey. Altogether, 144 farmers were interviewed from the three broad landholding

¹ The Chulliar dam, which is a part of the Gayatriputzha irrigation project, supplies water to this area.

categories – large, medium and small. Large farmers were classified as those with holdings above 2 hectares (ha), medium as those with holdings of 0.4-2 ha and small farmers as those with holdings below 0.4 ha.

The article begins with a brief discussion of the irrigation scenario that prevails in the study area, introducing the unique climatic features of the area and the various irrigation technologies and changes therein. The article then moves on to discuss the core theme, which is changing land and water rights regime. Following a theoretical discussion of property rights over land and water, it introduces the reader to the pattern of land rights and the agricultural landscape that existed before the implementation of the land reforms in the area. It then analyses the impact of the reorganisation of land rights on land and water management, commenting upon the conceptualisation of rights in isolation. This section also discusses how the redistribution of land rights has ignored the redistribution of water rights, thereby leading to both unsustainable and inequitable management of land and water. The final section of the article concludes with a discussion on property rights and sustainable resource management.

THE CHANGING IRRIGATION SCENARIO IN PALAKKAD

The eastern part of the Palakkad district is known for its unique geographic and climatic features. It also holds a unique position in the irrigation map of Kerala. The Chittur taluk (where the study was conducted) is located in the Palakkad Gap, a discontinuity in the continuous run of the Western Ghat mountain ranges that constitutes the eastern boundary of the state. This break in the mountain ranges, extending for about 45 km precipitates unique climatic conditions in the Palakkad plains, characterised by relatively higher temperatures, lesser rainfall and high-velocity hot and dry winds that blow in from the adjoining Coimbatore plains. Lower amounts of rainfall coupled with increased evapotranspiration rates have made water economy crucial in the region. The annual rainfall recorded at Kollengode during the study period was only 1459 mm, as compared to the state average of 2500 mm. In addition, during summers, the district of Palakkad, particularly those portions located in the Gap, record higher temperatures than most other parts of the state. Maximum summer temperatures recorded at Palakkad have often crossed 40°C (GOK, 2003).

Intermittent harvesting of surface run-off in kulams has helped in meeting the agricultural water requirements of the area. The characteristic feature of the kulams of the area consists of an embankment built across the line of drainage so as to hold back surface run-off. On average, they cover an area of 0.4-1.2 ha. The embankment or the main bund is supported by two other bunds on either side. On the remaining side there is no bund, as it lies along the slope. Sluices are then placed on the main bund to regulate the outward flow of water. These kulams were located in an agricultural-cum-forested landscape, with the catchment of ponds in the higher reaches consisting of forested land. Paddy is the main irrigated crop in the area. Altogether, there are 363 and 268 ponds in the Kollengode and Elavenchery panchayats, respectively (Kerala Land Use Board, 2001).

Since the 1950s, the advent of modern irrigation systems in the district has centred on the construction of reservoirs and canal systems, all of which have targeted the expansion and intensification of land under paddy cultivation. Palakkad is looked upon as the seat of canal irrigation in the state, home to seven major and medium irrigation projects. Almost all the canal irrigation systems in the district however perform far below their intended capacity (Vishwanathan, 2002). Deforestation in the reservoir catchments and consequent siltation of the reservoirs and inefficient distribution of water through the canals are the prime reasons for such a situation. The introduction of the canal systems has brought about significant alterations to the pond system of irrigation. The most significant outcome was that ponds began to be filled with water supplied through the canals, and over a period of time were viewed more as containers of canal water and less as catchment-based storages of water. In addition to the canals, tube wells and the streams constitute an important source of irrigation. The

failure of the canal and pond systems in meeting the water requirements of paddy has prompted farmers to increasingly invest in tube wells during the past decade.

CHANGING LAND AND WATER RIGHTS

Amongst the institutional arrangements that intervene in the human use of natural resources, property has been recognised as one of the most significant institutions (McCay and Acheson, 1987; Berkes, 1989; Hanna et al., 1996; von Benda-Beckmann, 2001) that determine not only who may use which resource and in what ways, but also shaping the incentives people have for investing in and sustaining the resource base over time (Meinzen-Dick and Pradhan, 2001). Problems of ownership over natural resources have long been the subject of intense debate, especially since Hardin (1968) wrote his essay on the Tragedy of the Commons, which triggered off discussions on the relationship between property regimes and sustainable natural resource management. Initial discussion on property concepts was dominated by the 'big four' categories: private, often individual ownership, state or public ownership, common or communal property and open-access resources (von Benda-Beckmann, 2001) and their implications on sustainable resource management. Of late, it has come to be recognised that there exists no simple and linear relationship between particular property regimes and the way in which land and related resources are used and managed under each regime (Bromley, 2002; Herring, 2002). It has, for instance, been illustrated that state ownership does not ensure protection of the resource base, just as much as decisions of individual owners is no assurance for proper stewardship of land and related resources (Bromley, 2002). On the contrary, in the context of private ownership regimes, von Benda-Beckmann (1992) argues that by granting free and unregulated access to scarce resources, the private property regime leads to the "tragedy of individual ownership". The perception of resource degradation during the past decades in particular has brought into sharper focus the search for appropriate property regimes that could ensure sustainable resource management as well as greater justice and equity in the distribution of access to resources, particularly, forests, water and air (Benda-Beckmann et al., 1996). In fact, a prominent focus of research on property rights and common-pool resources has been on how to construct ecologically sustainable and socially just environmental regimes in the face of complex patterns of resource ownership and use, and complex social relations among multiple actors (Sneddon et al., 2002).

Given the long historical interrelationship between land and water rights, it has been argued that efforts at addressing agriculture-related water needs must take into account the complex interlinkages between land tenure and water rights (Cotula, 2006). In most customary traditions on land and water use, the right to use water has been dependent on the use or ownership of land (Hodgson, 2004). The riparian law of water rights operational in many countries is, for instance, dependent on the ownership or use of land adjoining rivers and streams. Similarly, rights to the use of groundwater are linked to the use or ownership of land under which it is located. Therefore, land has been considered the most important property variable that determines the property character of irrigation water (Abeyratne, 1990), it being suggested that while examining property in water, and in particular property in irrigation, a 'back-door' approach through the examination of land rights be adopted (ibid). In some places water rights are tied to the land while in others they are fully severable (Cotula, 2006).

Land rights are defined as the system of rules, rights, institutions and processes, under which land is held, managed, used and transacted (Cotula, 2006). Land rights include ownership as well as a range of other landholding and use rights such as leasehold, usufruct, servitudes and so on (Cotula, 2006). The term "bundles of rights" is often used while describing this broad range of rights to land. Water rights have also been viewed as a type of property right that in conjunction with land rights assigns access, use, liability and control over water to some persons and social groups relative to others (Wescoat, 2002). While referring to land and water rights it has become increasingly common to refer to the concept of legal pluralism, which recognises the existence of multiple bases for claiming property rights (Meinzen-Dick and Pradhan, 2002). One important distinction is between public and private rights (von

Benda-Beckmann et al., 1996). In the specific case of water rights, it is important that the legal construction of categories of water rights is distinguished from the actual social relationships that connect right-holding entities (individuals, groups or associations) with concrete resources (ibid). These social relationships determine the way in which legal categories of rights are embedded in the immediate socio-economic context that determines rights over the means of appropriation (money, technology) (von Benda-Beckmann, 2001), that, in turn, determines rights to water. Rights to water are therefore intimately linked to a wider set of social relationships, land rights being one of them. The argument of Ribot and Peluso in favour of distinguishing access from rights is illuminative in this context. Property, according to them, refers to rights to things or resources sanctioned by law, while access is a broader term referring to legal and extra-legal measures and to a wider range of social and power relations that constrain or enable people to benefit from resources (Ribot and Peluso, 2003). In the present study, access to water is determined by the legal status accorded to each irrigation source (public, private or common), the existing social and power relations that determine access to water-lifting technologies and to the departmental bureaucracy that enables the privatising of common/public water sources.

The following section describes changing land relations that help to understand the present configuration of land and water rights in the study area. The implementation of the land reforms and the nationalisation of private forests have been analysed in detail. The changes brought about by the implementation of land reforms in the distribution of rights to land and water become clear when compared with the pre reform situation.

Land rights prior to land reforms

During the period of colonial rule, the Kollengode and Elavenchery panchayats were a part of the Malabar district of the erstwhile Madras province. Land relations in this region, as in other parts of the state, were dominated by land lease rather than by the ownership of land.² Also, as in other parts of the state, individuals with landowning rights were known as *janmis* (referred to as landlords in most academic writings on this issue). Three broad categories of persons were involved in land tenure arrangements, the *janmis*, the *kanakkar* (a person holding the controlling rights of land of a janmi) and the *verumpattakar* (various types of cultivating sub-tenants) (Ganesh, 1991). While ownership of the land was vested with the janmis, they did not engage in cultivation directly, not even in supervision of the field and crops. The janmi was connected to the actual tiller of the soil through various kinds of lease/mortgage arrangements, mediated by a number of intermediaries, who held lands vested with the janmi on payment of a share of the produce (referred to as *patam* or *varam* in Malayalam). They normally entrusted cultivation of the land to the *kanakkar*, who were the principal tenants, most of whom were again non-cultivators (Sardamoni, 1982), on payment of a lump sum in money or in kind, and an additional nominal payment or rent along with other customary fees and dues. The *kanakkar* were again mostly intermediaries, exercising control over the land owned by the janmis, by sub-letting the land to various types of cultivating sub-tenants, collectively known as *verumpattakar*. Hence, while the janmi held customary rights over land, the *kanakkar* held the controlling rights, and the actual cultivation was undertaken by the *verumpattakar* (Sardamoni, 1982). The hierarchy of land control and privilege roughly paralleled the caste-based hierarchy of social status (Herring, 1990).³ Ownership of land in the study area during the pre-land reform era was largely vested with higher castes such as the

² The critical point of difference between ownership and leasehold tenure is that in the case of the latter, there exists a separation of ownership from control. Under this form, while the ownership of land is vested with a particular person or institution, the actual use of the land is undertaken by another. In this system, the user of the land does not have permanent rights to land, the rights to the use of land being confined to the term of the lease.

³ Though tenurial relations and social structures were extremely complex, high social standing has generally been associated with a right to income from the land without working on it, whereas those of the lowest social status have traditionally worked the land without owning it (Herring, 1983).

Brahmins, princely families such as the Kollengode Kovilakam and prominent Nair families. The cultivating tenants were mostly from the Ezhava caste, another major social group, who were below the Nairs in the caste hierarchy. Muslim tenants were also not uncommon. Below the cultivating tenants were the large group of landless agricultural labourers, on whom the tenants depended for agricultural work. They constituted the lowest rung in the caste hierarchy. In the study area, they largely came from the Cherumakkal caste group.

Despite this hierarchy of the groups involved in agriculture, it has been argued that land did not belong to any individual or group as private property (Radhakrishnan, 1981). The different social groups involved are considered to have enjoyed different rights and interests in the land, which more or less corresponded to their position in the then existing ritual and social hierarchies. Despite the possibility of evictions, the kanakkar and the verumpattakar were also said to enjoy hereditary rights according to local custom. It was not uncommon therefore for customary relationships between landlords and tenants to extend over two to three generations. Members of hitherto tenant families for instance recall that their families had cultivated the same piece of land for the past 50-100 years. The most oft quoted opinion on the issue of land rights is that of a British officer, William Logan, the Collector of Malabar in 1881, who had been appointed by the colonial rulers to study the prevailing land and agrarian relations in Malabar, particularly in the context of the prevailing agrarian discontent in Malabar.⁴ Logan was of the view that 'joint proprietorship' in the soil existed in Malabar till the second half of the eighteenth century, wherein five hierarchical groups exercised rights to the land. This comprised the janmi, kanakkaran, verumpattakaran, *cherujanmakaran* (comprising artisan and other service caste groups such as carpenters, blacksmiths, washer folk and so on), and the agricultural labourers. According to Logan, the first three groups divided the net produce from the soil after providing for the customary dues to the latter two groups. The rights and interests of all these groups were regulated and restricted by customary laws. The fact that no single individual or group exercised exclusive rights to the land is revealed by the fact that in the event of sale of land, the customary rights of persons holding rights as kanakkar, verumpattakar, as artisan and service castes, hutment dwellers and agricultural labourers had to be recognised (ibid). This system of joint proprietorship is considered to have undergone changes in the second half of the eighteenth century, first with the introduction of direct revenue administration by the Muslim rulers of Mysore who conquered Malabar, and later further with the far-reaching changes brought about by British rule towards the end of the eighteenth century (Logan, 1887).

The introduction of the two broad categories of 'landlord' and 'tenant' by the British is considered an attempt to simplify this complex and overlapping system of land rights (Vani, 2002). Colonial misinterpretation of customary land tenure has been attributed to have caused an imbalance in power relations between the janmi and the various classes of leaseholders (Ganesh, 1991; Prakash, 1987; Sardamoni, 1982). Logan argued that the British misunderstood the position of the janmi as the absolute owner of the soil.⁵ Such an interpretation is also argued to have been part of the colonial objective of maximising land revenues by creating a section of powerful, landed people who would act as their agents in the region (Prakash, 1987). Hence, while the janmi came to occupy a position of considerable power in the decades preceding the implementation of land reforms, it has been argued that this was not always so.⁶ The transformation of janmis from customary to statutory landowners enhanced their power and privileges, giving them the right to increase rents payable by tenants and to legally evict them for non-payment of rent or on expiry of the lease period (Ganesh, 1991). The increasing power of the janmi prompted campaigns for tenancy reform during the colonial period itself.

⁴ *Malabar* written by Logan, popularly known as the *Malabar Manual* was compiled during his tenure as Collector of Malabar. It is an exhaustive volume giving details of the geography, people, their religion and caste, language and culture.

⁵ The Board of Revenue for instance is reported to have maintained in 1818 that the *janmi* "possessed a property in the soil more absolute than even that of the landlord in Europe" (Board of Revenue Proceedings cited in Menon, 1994).

⁶ Most of the personal accounts that one hears of the *janmi-kudiyar* relationship today (as narrated by farmers from their memories) pertain to the late colonial period, when *janmis* were in substantially powerful positions.

Legislations in favour of tenancy reform finally culminated in the passing of the land reform act in the post-independent era in 1970, which did away with the *janmi-kudiyar* (landlord-tenant) system of land relations.

The agricultural landscape

Apart from the fact that use rights to the land did not coincide with ownership rights, a tenant cultivator's rights to land included use rights to multiple resources: agricultural land (both paddy and non-paddy land), forest land and the water stored in ponds. A holding of about 4-6 ha cultivated on lease would therefore normally consist of paddy land, some *parambu* land (cultivable land), a *kalam* (threshing floor or space for carrying out post-harvest operations), and in many cases a pond, or more than one. Given the close relationship between livestock-rearing and agriculture (cattle required for ploughing and cattle manure required for fertilising the fields), each tenant would maintain a stock of cattle. The cattle shed was therefore an integral part of the landholding, a person being appointed to take care of the cattle in many cases.

Cultivable land was classified into *parambu* and *padam*. *Padam* land refers to paddy land in the lower slopes and valley bottoms, which is further divided into two broad categories, *potta* and *kalayi*. *Potta* refers to single-cropped paddy land located on the lower slopes, and *kalayi* refers to double- or even triple-cropped paddy land located in the valley. *Parambu* land is located on the higher slopes, covered by a wide mix of trees. Given the gently undulating terrain of the area characterised by small hills and valleys, *parambu* land on the higher slopes was interspersed with valleys cultivated with paddy.

Some parts of *parambu* land were wild, and other parts consisted of trees largely grown for human use, referred to as *chappukad* (*chappu* meaning litter). The plant and tree growth in the *chappukad* was used as both fuel wood and fertiliser for the paddy fields. The leaves and the bark of certain trees, along with cow dung were ploughed into the paddy fields before the commencement of the first crop of paddy in the month of April. In some cases, *parambu* land also enclosed small patches of dense vegetation mostly around a small place of worship (referred to as *kavu*). The vegetation around the *kavu* was protected and considered sacred, and referred to as *valartukadu*. Many of these *chappukadus* and *valartukadus* were classified as private forests under the ownership of e. In addition to the tree cover on the *parambu* land, the forests in the mountains were also a rich repository of green manure, fodder and fuel wood. They were mostly owned by the princely family, the Kollengode Kovilakam. People had to pay a small amount, known as *chungam* (toll) to the guard appointed by the Kovilakam for this purpose.⁷ The vegetation cover on the *parambu* lands and in the mountains therefore played an important role in sustaining the resource requirements of paddy cultivation in the area.

The catchment of many ponds located in the higher reaches mostly consisted of such forested land. The organic matter that would drain into the pond following a spell of rainfall was considered to enrich the nutrient content of the water. As a result, farmers took care in diverting storm flows into their ponds. The forest and tree cover on the higher slopes exercised an important influence on the water regime of the area as well, conserving soil and water, and recharging the aquifers that fed ponds and wells in the lower reaches.

THE REORGANISATION OF LAND RIGHTS: IMPACT ON LAND AND WATER MANAGEMENT

Two legal interventions that altered the property rights regime in the area were the Kerala Land Reforms Act of 1963, which came into effect in 1970 and the Kerala Private Forests (Vesting and Assignment) Act of 1971. In Kerala, the case for land reforms had its precedents in the struggles waged

⁷ One such person by the name of Krishnan who used to work as a forest guard for the princely family in the pre-land reform era, continues to be known as '*chungam* Krishnan'. Farmers from the area recall how they along with other family members would go to the forests to collect different varieties of leaves, which were dried and reserved as fodder for the goats during the monsoons, when it would not be easily available.

for tenancy reform, which were headed by the relatively well-to-do tenants in different parts of the state (Radhakrishnan, 1982), demanding the abolition of rack-renting and forceful evictions by the landlords. The primary objectives of the Kerala Land Reforms Act that came into effect on 1 January 1970 was reducing landlessness and abolishing tenancy. The three main components of the land reform programme in the state centred on conferring ownership rights on cultivating tenants for the land leased in by them, giving an option to homestead tenants (*kudikidappukar* who were landless agricultural labourers) to purchase homestead land from their landowners, and finally taking possession of the surplus lands by the imposition of ceiling laws for distribution among the landless labourers and land-poor farmers (Ramachandran, 2000; Radhakrishnan, 1982).⁸ The most important outcome of the act was that all rights, titles and interests of the landowners and intermediaries over holdings cultivated by tenants were vested in the government, and in so doing full ownership rights were granted to the cultivating tenants over land cultivated on lease. Tenants were expected to pay only a nominal sum as purchase price.⁹

Another closely associated legal intervention was the nationalisation of private forests in the state through the implementation of the Kerala Private Forests (Vesting and Assignment) Act of 1971. Surplus lands (lands in excess of the ceiling) available for redistribution among the landless proved insufficient, as a result of which the government of Kerala decided to take over the private forests as a part of agrarian reforms, and to distribute a part of it amongst the landless (Chundamannil, 1993). As an outcome of this act, all private forests in the state hitherto vested with the landlords (consisting of the earlier mentioned valartukadu and chappukadu, as well as the forests in the mountains) were taken over by the state, in order to assign them to agriculturists and agricultural labourers for cultivation, the objective being to utilise the "viable private forests land" to "increase the agricultural production and to promote the welfare of the agricultural production in the state" (SPB, 1997).

Land reforms in Kerala, despite being hailed as the "most radical, comprehensive and far-reaching in South Asia" (Christodolou, 1990), have been critiqued for having failed to benefit the most needy, i.e. the landless.¹⁰ While tenants, in particular the large tenants, received the maximum benefit, the landless labourers benefited little.¹¹ While abolition of tenancy was successfully carried out, land above the ceiling limit and consequent redistribution were not effectively identified (Ramachandran, 2000), leading to a watering down of the provisions of the act.¹² Evasion of the ceiling limit was also made possible by the time lag between its promulgation and its final implementation. The time lag factor also applied to the implementation of the Vesting Act, which had been in the offing since 1962 when a bill was passed for the takeover of private forests, but implemented only in 1971. During the 1960s, most

⁸ As per the stipulated ceiling, an adult unmarried person was allowed to hold only 5 standard acres (2 ha) subject to a maximum of 7.5 ordinary acres (3 ha), and a family of five members consisting of a husband, wife and their unmarried minor children could hold 10 standard acres (4 ha) subject to a maximum of 15 ordinary acres (6 ha). Standardization was done on the basis of classification and productivity of the land, one acre of coconut garden or double crop wetland being considered as one standard acre. Exemption from the ceiling was conferred on essential items like lands cultivated with plantation crops like tea, coffee, rubber, cardamom, along with private forests, house sites and commercial sites (SPB, 1997).

⁹ This purchase price was fixed as the aggregate of 16 times the fair rent of the landholding plus the value of structures, wells and embankments of a permanent nature, and one half of the value of timber trees belonging to the landlord or intermediary subject to a maximum of 16 times the fair rent. The purchase price was treated as a debt to the government and the tenants were not bound to forfeit their rights for default in paying (Radhakrishnan, 1981). In the study area, it has been reported that many of the tenants had not paid up the full sum of money due from them.

¹⁰ Balakrishnan argues that no state in India, not even the communist regime in Kerala which initiated the process of land reforms in the state, "has passed a land reform or agrarian relations act requiring the cultivators to till" (Balakrishnan, 1999).

¹¹ The largest tenant-cultivators of the pre-reform era are the biggest landowners today, and the landholding pattern continues to be skewed in the area. As of 1995-96, each of the approximately 80% of the individually operated holdings in the Kollengode Block Panchayat was below 0.5 ha, occupying only about 10.41% of the total area. In contrast, holdings above 2 ha in area comprised only 8.7% of the total number of holdings, but covering 66.25% of the total area (GOK, 2001).

¹² Farmers report that there had been numerous instances when landlords and large tenants partitioned the land amongst their children and resorted to bogus transfers of land to married daughters and sisters. This helped them to evade the laid-down ceiling.

of the private forest owners were inclined to sell the trees before the forests were taken over by the government (Chundamannil, 1993), a phenomenon reported from the study area as well. The forests owned by the Kollengode Kovilakam are reported to have been felled during the decade preceding nationalisation.¹³ The trend of clearing forests for groundnut cultivation in the hills had also intensified during this period.

Rights in isolation

Granting individual private titles to land and the consequent separation of ownership from control over land constituted the most important outcome of the land reforms. In the process of subdividing and redistributing the existing landholdings, the interconnections among parambu land, forestland and paddy land were ignored. When eland was surrendered as excess land by the landed, and the same was redistributed to the landless, the functions played by parambu land in sustaining paddy cultivation (in terms of supplying green manure) and in conserving soil and water were ignored. Similarly, the fact that parambu land was more suited to agroforestry rather than to paddy cultivation was not kept in mind when distributing it amongst the landless. Landless labourers who had received small parcels of parambu land unsuited for intensive cultivation had to remove the existing vegetation, invest in a well and then make efforts for cultivation. The case was similar when private forestland was taken away from the erstwhile janmis and redistributed as agricultural land. The ecological implications of such land conversion were not attended to. These forests had ensured the perenniality of the numerous hill streams that flowed down into the plains, which along with the ponds sustained paddy cultivation in the plains. While the takeover of the private forests by the State Forest Department was expected to ensure their protection, delayed implementation of the act along with other factors resulted in significant deforestation. The removal of customary control over forestlands led to a period of uncertainty, when the forests were neither managed by the erstwhile janmis nor by the state government.

The implementation of land reforms and nationalisation of private forests provide an illustration of the process of physically cutting up an agricultural-cum-forested landscape into private holdings and government parcels, neglecting the ecological interdependence between the two. The reduced availability of green manure, for instance, has now led the government to procure organic manure from outside the state and supply it to the farmers, in order to raise soil fertility. Non-agricultural land was not considered to be a part of the resource base of farmers. As a result, while granting individual titles to land, the larger resource context that was crucial in ensuring agricultural sustainability was not given any consideration. While correlations have been drawn between implementation of land reforms and agricultural productivity, the impact on land management and agricultural sustainability has received little attention (Mukhopadhyay, 2005). In the whole debate over the intended versus the actual outcome of land reforms in Kerala, the implications of the reforms on land and water management have received very little emphasis. While insensitivity to the sustainability dimension has led to such a fragmented approach, the conceptualisation of rights has also played a role. Commenting upon the conceptualisation of land rights in most western societies, Freyfogle (1996) notes that rights to a parcel of land are not framed with respect to the specific features of a parcel of land, i.e. with respect to the soils, terrain, vegetation and so on. This holds true for the prevailing conceptualisation of land rights in India as well. Had this been the case, forested land would not have been assigned as agricultural plots in the study area.

The absence of an ecological orientation to the property rights regime also results in land use practices that do not take into consideration the natural features of the land, and can thereby result in ecologically unsustainable land use patterns. The ongoing conversion of paddy lands into building sites

¹³ Sivaramakrishnan documents a similar process in Bihar where the time lag between the mooted of the programme of nationalization of forests and its final implementation enabled landlords, contractors, cultivating tenants and right-holders to rapidly cut and lease out forests, defeating the very purpose of the act (Sivaramakrishnan, 1999).

and to brick kilns is one such example. While conversion of paddy lands is the lowest in the Palakkad district, the trend has definitely set in. With the ready availability of JCB machines,¹⁴ levelling off sloping parambu land and selling it as house plots, or filling up low-lying paddy fields for building construction are becoming increasingly common. Both of these result in serious alterations to the local topography. The filling of ponds with earth and their subsequent conversion into building sites are also common. With the boom in construction activities in the state over the past decade, there has been a phenomenal increase in the market price for sand as well. Very often, private landowners hire JCBs, mine the sand from their fields and make a fortune by selling it. These are some of the outcomes of the increasing urbanisation of a predominantly agrarian landscape. The existing formulation of land rights, which holds the right of the landowner as supreme and sacrosanct, allows unbridled access and resultant overexploitation of resources by right holders. The Kerala Land Utilisation Order issued by the Government of Kerala in 1967 was the government's response to check the rampant conversion of paddy lands. By declaring illegal the conversion of paddy lands, the act aimed at preventing further reduction in paddy production levels, as well as maintaining the unique ecological functions of paddy wetlands, given the important role they play in recharging the water table. These land use regulations however are not "inherent in the bundle of rights and obligations that makes up land ownership" (Hodgson, 2004) as a result of which evasions do not lead to the imposition of fines or other regulatory measures.

Land without water

Another instance of fragmented rights is the manner in which rights to land and water were treated separately following the implementation of the land reforms. Once again, the interconnectedness between the two was not attended to. The crop-producing potential of a particular piece of land in the area is determined by access to ponds, streams and wells, as well as by its location in the concerned micro-catchment which determines its moisture-retention capacity. The existing classification of paddy lands into kalayi and potta stemmed from their topographical location in the catchment. While reorganising land rights in the region however, the focus was on the size of the landholding and not on the location of the holding in the micro-catchment or with respect to a pond. As a result, not all landholdings had equal rights to water. The resultant inequity that was precipitated severely undermined the element of distributive equity inherent in the land reform initiative. The large tenants and landowners retained lands that had rights to water stored in ponds, surrendering only those lands which were not located in the pond *ayacuts* (command areas). As a result, the landless, who were to benefit the most out of the land reforms, received land parcels that were not located in any pond ayacut. In most cases, they received sloping parambu land that was unsuited for intensive paddy cultivation. A survey conducted amongst farmers belonging to three main landholding categories (large, medium and small) in the area in 2001-2002 revealed that while 89% of large farmers have rights to water stored in ponds, the proportion came down to 48% and 23% in the case of medium and small farmers, respectively.¹⁵

Land redistribution through the land reforms made another serious omission. It failed to give due attention to the existing kalayi-potta system of land classification. This was particularly so as kalayi-potta was not only a system of land classification but also a system of allocating water. All kalayi lands had rights to water stored in the pond for a second crop of paddy, whereas potta lands did not. If at all

¹⁴ JCB machines are heavy earthmoving equipments that are commonly used to level sloping land. The machines are named after the company that produces them, JCB. The company in turn is named after its founder, Joseph Cyril Bamford.

¹⁵ A total of 144 farmers were surveyed to assess access to water, with 48 farmers from each of the above-mentioned three landholding categories. In order to illustrate differentiated access to water amongst these three groups, percentages have been calculated for each group separately. Hence, while the total number of farmers interviewed is 144, percentages have been calculated separately for each of the three 48-member landholding group. Hence 89% of the large farmers implies 89% of the 48 farmers from the large landholding group.

they did, it was only to the water that flowed through the higher sluice of the pond. In some cases, lifting of water was permitted, but again since it was manual lifting it was resorted to only in cases of great urgency. By virtue of this restricted allocation of water rights, double-cropping of paddy was confined to kalayi lands alone. This helped to minimise the incidence of crop loss and to maximise the chances of a good crop on kalayi lands. By ignoring the existing kalayi-potta classification, land redistribution led to an unequal distribution of kalayi and potta lands. The former landlords and large tenant-turned-cultivators retained more of kalayi lands. Along with equity implications, this omission had important implications on the discretionary use of water supplies in the pond as well. In the pre-reform situation when one or a few tenants managed a single pond ayacut, cultivation of potta lands was often abandoned in order to save the water for the e fields where crops had a better chance of survival. Even amongst the kalayi lands, only the most low-lying lands would be cultivated with a second crop of paddy when water supply was severely limited. In the years following the land reforms and the further fragmentation of individual parcels through partitioning and sale, each pond ayacut was split up into a larger number of individual parcels, and each parcel would consist of either potta or kalayi lands. Coordinated use of water to both these different land categories became increasingly difficult. The owner of potta lands was equally determined to raise a crop, despite the reduced availability of water in the pond. Had land reforms ensured a more equitable distribution of kalayi and potta lands, both sustainable water use and equitable water distribution could have been achieved.

The situation was further complicated by the introduction of modern canal irrigation and pumping devices in the area. With the filling up of ponds with water supplied through the canals, the kalayi-potta distinction was gradually abandoned. Farmers explain that the refilling of ponds with canal water at least twice during the second crop season made it seem that it was no longer necessary to abide by this classification. The introduction of energised pumping and its spread during the 1970s and 1980s made lifting of water to potta lands a far easier proposition. This led to a situation where both kalayi and potta lands began to be irrigated during the second crop season. However, because they retain far less moisture, this led to a greater consumption of water, as potta lands require frequent irrigation during the second crop of paddy. The earlier classification of water rights, whereby rights were restricted in order to conserve the existing water supplies, was replaced by a new system, which gave little regard to the issue of conservation. This was largely prompted by the external availability of water.

The practice of viewing land and water in isolation had implications on both equity and sustainability. The land reforms, by ignoring the skewed distribution of water rights, undermined the goal of equity. The availability of external water supplies through the introduction of canal irrigation coupled with the introduction of energised pumping led to the abandoning of the existing land classification system that endorsed principles of water conservation. The concurrent consolidation of the private property regime enabled the right holders to indulge in unsustainable levels of resource consumption.

Enclosing water within land parcels

Along with ponds, the canals, streams, shallow wells and pits and tube wells form an integral part of the water system that supplies water for agriculture. Each of these irrigation sources is given a distinct property status that determines the extent of access that individuals exercise over it. Of these, canal water is considered as state property. The wells (both shallow and deep) are private property and so are the shallow pits. Water flowing through streams, though common, can be accessed only by those who own riparian land. Ponds and wells are classified as private property as they are located on privately owned land parcels.

The increasing unreliability in the supply of water through the government-owned canal systems has prompted farmers to invest more in the above-mentioned private sources of irrigation and to enclose the water within their private landholdings. Amongst the large farmers, a new trend that has been noted is that of setting up an interlinked system of ponds, tube wells and shallow wells or pits within their holdings. Two instances were observed where the water pumped up from the tube well was

stored in individually owned ponds, and in one instance, it was even sold to water-needy farmers. The availability of energised pumping devices, coupled with the prevailing perception of these irrigation sources as private property of the concerned landowner, creates a situation of uncontrolled exploitation of water. The water extracted is of a significant nature in the case of tube wells, often leading to falling water levels in nearby shallow wells. The ability to invest in energised pumping devices determines the extent of access that individuals exercise over private sources of irrigation, strengthening private control over water in all these sources. Energised pumping also leads to differentiated access, converting public resources into open access ones as in the case of the stream.

In cases where the irrigation source is a public or common resource, all attempts are made to direct these flows into private enclosures. The commonly resorted act of diverting public canal water into private ponds is the best example in this case. All farmers engage in this practice in a very discreet manner. In the case of a stream, while it is considered public or state property, riparian landowners are entitled to use the water in the stream for irrigation. Existing irrigation laws however forbid them from pumping water from streams and rivers. Farmers are found to evade this restriction by digging wells on riparian land and pumping water from these wells. Theoretically, the water in the wells is private property as it is located on private land, but in reality it is the water in the stream that seeps into the well. Farmers acquire the necessary departmental sanction for the installation of electric pump sets by showing the well as the water source and not the stream. Bribing the concerned bureaucrats is reported to be common to acquire this sanction.¹⁶ While pumping of water from the streams has intensified over the past two decades, its impact on the water table in the wells, on downstream flows and on disappearing riparian vegetation has not yet been assessed.

PROPERTY RIGHTS AND SUSTAINABILITY

The underlying assumption that guides water extraction for irrigation in the area is that once water is enclosed within privately owned landholdings, its use is not subject to any public discretion. The private landowner is free to use it as he or she pleases, irrespective of its impact on the larger hydrological system. Unregulated private property regimes have been argued to be unsuitable for the management of common-pool resources (Torori et al., 1996). Private property rules have also been critiqued for treating natural resources as temporally and spatially bounded commodities (Ojwang and Juma, 1996), granting individual private rights to an essentially integrated system (McKean, 2000). At a more fundamental level, existing property categorisations have been critiqued for their inadequate understanding of the ecological properties of the resources concerned (Klug, 2002). This has been argued to be particularly so in the case of an extensive and fluid resource like water which follows no clearly defined boundaries (Hodgson, 2004; Sick, 2007). In the case of groundwater for instance, private ownership has been found to be unsuitable to the management of a resource that does not follow landownership boundaries (Bhatia, 1992; Burke et al., 1999; Meinzen-Dick, 2000). This however is true of surface water systems as well, current use patterns being sanctioned without any understanding of the intricate interconnections between different components of the hydrological system.

¹⁶ The procedure is as follows: the farmer who wishes to install an electric pump set to lift water from a private water source such as a pond or well, renders an application to the office of the Agriculture Department, i.e. the Krishi Bhavan. The Agricultural Officer either visits the site or deposes another official to do so. The official concerned is expected to make a recommendation for the installation of the pump set after testifying that the water source in question is not a public water source, and assessing the extent of land to be irrigated. The recommendation that the farmer concerned be allowed to use a pump set of a particular horse power is made after assessing the water requirements of the land to be irrigated. This recommendation is then forwarded to the Electricity Department, which then gives the sanction for the purchase of the pump set. In this case, the government officer has to testify that the well located on riparian land is a private well. The fact that is concealed is that while the well is private, the water in the well is not. Bribing the concerned officer is therefore reportedly common.

In the case of water therefore, arguments have been made in favour of a property rights regime that recognises the physical features of the resource (Burke et al., 1999; Bhatia, 1992). Keeping in mind the hydraulic interconnectedness between surface water and groundwater, Hodgson (2004) has even argued that surface water and groundwater systems be governed by a single property rights regime. While this is not easy to put into practice, the first step would be to have a property rights regime that keeps in mind the physical features of the resource concerned. Extraction of water from flowing streams for instance would then be restricted not only because of declining flows in the stream but also because of its likely impact on the groundwater aquifer. Similarly, an individual's right to exploit the groundwater reserve below his or her land would be subject to its likely impact on the water table in nearby shallow wells, or on base flows in streams.

Prevailing unsustainable land and water use patterns reflected in the conversion of paddy lands to building sites and brick kilns, levelling off of sloping parambu land, rock and sand mining and pumping out water (both surface water and groundwater) well outside sustainable limits necessitate a reconsideration of the unconditional access sanctioned by the existing rights regime. This would imply a questioning of the existing framework, which is rooted in the superiority of human entitlements, paying little attention to the need of long-term protection of the resource concerned (Freyfogle, 1996; Klug, 2002). Such reconsideration necessitates re-envisioning rights to resources within their ecological context. Rights to use that individuals exercise over land and water need to be subject to certain conditionalities. In the case of land, an important criterion would be that ownership and use rights do not alter the basic ecological features of the land, and thereby threaten the long-term sustainability of the resource. The implications of the ongoing mining of sand and rock from private holdings on drainage patterns and groundwater recharge for instance demand immediate attention. The hydrological implications of filling up ponds are equally serious. High levels of water extraction also need to be regulated, keeping in mind its impact on the larger hydrological system. While this seems infeasible, given the omnipresence of the private property mode of resource ownership, alternative conceptualisations of property rights are necessary if sustainable management and use of resources are to be ensured.

CONCLUSION

This article has analysed the impact of a changing property rights regime over land and water on the management of these resources. An analysis of the implementation of land reforms in the area has unravelled the existing configuration of land and water rights. The process of land reform implementation that has been detailed in the article explains the existing fragmented approach to land and water rights. Land use considerations were also overlooked while fragmenting an agricultural-cum-forested landscape into private- and government-owned land parcels. This has important implications for sustainable land and water management in the state. This is an issue that will assume increasing relevance as contestations over rights to land intensify. The article has also shown how the tying up of land and water rights and the unregulated use of water-lifting devices have enabled the creation of private enclosures of water in a water-scarce region. Locating property rights within their social and ecological context, and reconsidering the existing rights regime are important for the goals of sustainable land and water management.

ACKNOWLEDGEMENTS

We thank Peter Mollinga, Ruth Meinzen-Dick and two anonymous reviewers for their valuable comments on the text. We also thank farmers from Kollengode and Elavenchery for spending much time with us, discussing many of the issues raised in this article.

REFERENCES

- Abeyratne, S.D. 1990. Rice, rehabilitation and rural change: Social organization and state intervention in small-scale irrigation systems in Sri Lanka. PhD thesis. Cornell University, Ithaca, US.
- Balakrishnan, P. 1999. Land reforms and the question of food in Kerala. *Economic and Political Weekly* March 22-29.
- Berkes, F. (Ed). 1989. *Common property resources: Ecology and community-based sustainable development*. London: Belhaven.
- Bhatia, B. 1992. Lush fields and parched throats. Political economy of groundwater in Gujarat. *Economic and Political Weekly* December 19-26.
- Bromley, D.W. 2002. Property regimes for sustainable resource management. In Richards, John F. (Ed), *Land, property and the environment*, pp. 338-354. Oakland, California: Institute for Contemporary Studies.
- Burke, J.J.; Claude, S. and Moench, M. 1999. Groundwater management and socio-economic responses. *Natural Resources Forum* 23(1999): 303-313.
- Christodoulou, D. 1990. *The unpromised land. Agrarian reform and conflict worldwide*. London: Zed Books.
- Chundamannail, M. 1993. *History of forest management in Kerala*. KFRI Research Report No. 89. Peechi: Kerala Forest Research Institute.
- Cotula, L. 2006. *Land and water rights in the Sahel. Tenure challenges of improving access to water for agriculture*. IIED Issue Paper No. 139. London: International Institute for Environment and Development.
- Dubash, N.K. 2007. The local politics of groundwater in North Gujarat. In Baviskar, A. (Ed), *Waterscapes. The cultural politics of a natural resource*, pp. 88-114. Uttaranchal: Permanent Black.
- Freyfogle, E.T. 1996. Ethics, community, and private land. *Ecology Law Quarterly* 23: 631-61.
- Ganesh, K.N. 1991. Ownership and control over land in medieval Kerala: Janmam-kanam relations during the 16th-18th centuries. *Indian Economic and Social History Review* 28(3): 299-321.
- GOK (Government of Kerala). 2001. Panchayat level statistics. 2001. Trivandrum: Department of Economics and Statistics.
- GOK. 2003. District handbooks of Kerala. PALAKKAD. Trivandrum: Department of Information and Public Relations.
- Hanna, S; Folke, C. and Maler, K.-G. 1996. Property rights and the natural environment. In Hanna, S.; Folke, C. and Maler, K.-G. (Eds), *Rights to nature. Ecological, economic, cultural, and political principles of institutions for the environment*, pp. 1-12. Washington, DC: Island Press.
- Hardin, G. 1968. The tragedy of the commons. *Science* (1968): 1243-1248.
- Herring, R.J. 1983. *Land to the tiller*. New Haven: Yale University Press.
- Herring, R.J. 1990. Rethinking the commons. *Agriculture and Human Values* 7(2): 88-104.
- Herring, R.J. 2002. State property rights in nature (with special reference to India). In Richards, J.F. (Ed), *Land, property and the environment*, pp. 263-297. Oakland, California: Institute for Contemporary Studies.
- Hodgson, S. 2004. *Land and water – The rights interface*. Rome: FAO.
- Kerala State Land Use Board. 2001. Vibhava Bhoopada Nirmana Report (In Malayalam). Report on resource map preparation. Palakkad Zilla: Kollengode and Elavenchery Grama Panchayats.
- Klug, H. 2002. Straining the law: Conflicting legal premises and the governance of aquatic resources. *Society and Natural Resources* 15(8): 693-707.
- Logan W. 1887. Malabare. Madras: Government Press, Reprint 1951.
- McCay, B.J. and Acheson, J.M. 1987. Human ecology of the commons. In McCay, B.J. and Acheson, J.M. (Eds), *The question of the commons. The culture and ecology of communal resources*, pp. 1-36. Tucson: The University of Arizona.
- McKean, M.A. 2000. Common property: What is it, what is it good for, and what makes it work? In Gibson, C.; McKean, M. and Ostrom, E. (Eds), *People and forests. Communities, institutions, and governance*, pp. 27-55. Cambridge MA: MIT Press.
- Meinzen-Dick, R.S. 2000. Public, private, and shared waters: Groundwater markets and access in Pakistan. In Bruns, B.R. and Meinzen-Dick, R.S. (Eds), *Negotiating water rights*, pp. 245-263. New Delhi: Vistaar Publications; London: Intermediate Technology Press.
- Meinzen-Dick, R.S. and Pradhan, R. 2001. Implications of legal pluralism for natural resource management. *IDS Bulletin* 32(4): 10-17.
- Meinzen-Dick, R.S. and Pradhan, R. 2002. *Legal pluralism and dynamic property rights*. CAPRI (Collective Action and Property Rights) Working Paper No. 22. Washington, DC: International Food Policy Research Institute.

- Menon, D.M. 1994. *Caste, nationalism and communism in Malabar (1900-1948)*. Cambridge, UK: Cambridge University Press.
- Mukhopadhyay, P. 2005. Now that your land is my land... does it matter? A case study in western India. *Environment and Development Economics* 10(1): 87-96.
- Nair, S.C. 2004. A note on the ecological impact of the proposed Pathrakadavu Hydro-Electric Project (PHEP) in the Kunthi river, Palakkad district of Kerala. www.salimalifoundation.org/pathrakadavu.html
- Ojwang, J.B. and Juma, C. 1996. Towards ecological jurisprudence. In Juma, C. and Ojwang, J.B. (Eds), *In land we trust. Environment, private property and constitutional change*, pp. 309-3330. Nairobi: Initiatives Publishers.
- Prakash, B.A. 1987. *Agricultural development of Kerala from 1800 AD to 1980 AD: A survey of studies*. Working Paper No. 220. Centre for Development Studies. Trivandrum: Centre for Development Studies.
- Radhakrishnan, P. 1981. Logan's legacy. *Economic and Political Weekly* July 11-18.
- Radhakrishnan, P. 1982. Land reforms and changes in land system. Study of a Kerala village. *Economic and Political Weekly* September 1982: 107-119.
- Ramachandran V.K. 2000. Kerala's development achievements and their replicability. In Parayil, G. (Ed), *Kerala: The development experience. Reflections on sustainability and replicability*, pp. 88-115. London: Zed Books.
- Ribot, J.C. and Peluso, N.L. 2003. A theory of access. *Rural Sociology* 68(2): 153-181.
- Saradhamoni, K. 1982. Women's status in changing agrarian relations. A Kerala experience. *Economic and Political Weekly* January 30: 155-162.
- Sick, D. 2007. Yours, mine and ours. Managing water resources in the Mexican-US borderlands. In Baviskar, A. (Ed), *Waterscapes. The cultural politics of a natural resource*, pp. 65-87. Uttaranchal: Permanent Black.
- Sivaramakrishnan, K. 1999. *Modern forests: Statemaking and environmental change in colonial eastern India*. Stanford, CA: Stanford University Press.
- Sneddon, C.; Harris, L.; Dimitrov, R. and Ozesmi, U. 2002. Contested waters: Conflict, scale, and sustainability in aquatic socioecological systems. *Society and Natural Resources* 15(8): 663-675.
- SPB (State Planning Board). 1997. Ninth Five Year Plan (1997-2002). Report of the Task Force on field crops. Trivandrum: State Planning Board.
- Torori, C.O.; Mumma, A.O. and Field-Juma, A. 1996. Land tenure and water resources. In Calestous, J. and Ojwang, J.B. (Eds), *In land we trust. Environment, private property and constitutional change*, pp. 143-174. Nairobi: Initiatives Publishers.
- Vani, M.S. 2002. Customary law and modern governance of natural resources in India – Conflicts, prospects for accord and strategies. In Pradhan, R. (Ed), *Legal pluralism and unofficial law in social, economic and political development*. Papers of the XIIIth International Congress on Folk Law and Legal Pluralism, Thailand, April 2002.
- Vishwanathan, P.K. 2002. Irrigation and agricultural development in Kerala: An analysis of missed linkages. *Review of Development and Change* 7(2): 279-313.
- von Benda Beckmann, F. 2001. Between free riders and free raiders: Property rights and soil degradation in context. In Heerink, N.; van Keulen, H. and Kuiper, M. (Eds), *Economic policy and sustainable land use. Recent advances in quantitative analysis for developing countries*, pp. 293-316. Heidelberg and New York: Physica-Verlag.
- von Benda-Beckmann, F.; von Benda-Beckmann, K. and Spiertz, H.L.J. 1996. Water rights and policy. In Spiertz, H.L.J. and Wiber, M. (Eds), *The role of law in natural resource management*, pp. 77-99. The Hague: VUGA.
- von Benda-Beckmann, F. 1992. Uncommon questions about property rights. *Recht Der Werkelijkheid* 1: 8-14. Gravenhage: VUGA.
- Wescoat, J.L. Jr. 2002. Water rights in South Asia and the United States: Comparative perspectives, 1873-2000. In Richards, J.F. (Ed), *Land, property and the environment*, pp. 298- 354. Oakland, California: Institute for Contemporary Studies.