

DIALECTICAL INSTITUTIONS FOR ANIMAL GENETIC RESOURCES MANAGEMENT*

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Abstract

The paper discusses the role of local institutions in defining how animal genetic resources are governed at the village level emphasising the interaction between private and common property regimes in rural areas of Rajasthan, India. The legal pluralism approach has been applied and an institutional analysis has been carried out considering the 'rules in use' at the local and global levels.

1. Introduction

1.1 Research Background

Local institutions and knowledge in genetic resources management have not been properly investigated in terms of significance and validity. Therefore, the importance of social capital, including factors such as trust, specialisation and reciprocity has not been filtered into general awareness. This is particularly evident in the area of domestic animal diversity (Rathore and Kholer-Rollefson 2002).

Of the institutions that affect how people interact with natural resources, property rights (PR) are among the most influential. PR are established to organise the access to the bundle of resources available in a particular area. Those rights will shape people's entitlements (Bromley, 2000).

1.2 Research Location

The field work was located in Pali district, Rajasthan, India. The name of the physical region is Marwar and it includes a small valley named Godwar, surrounded by Aravalli mountains. The first set of interviews was conducted with members of the group called 'Godwar' Raika, the second set with 'Marwar' Raika. The two branches of the Raika caste do not intermarry but follow the same socio-cultural traditions (Srivastava, 1997). The Raika are a subgroup of

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the Rebari, the largest pastoral group of Western India that is concentrated in Rajasthan and Gujarat and estimated to number about 500,000-800,000 people (Srivastava, 1999). The Raika are a community of animal breeders whose activity is traditionally related to the sheep and camel husbandry.

1.3 Research Objectives

The objectives of the research have been to understand:

- which range of resources and rights are related to livestock (ownership, use, consumption, transfer, control, breeding choice); and for each right, which is the form of property regime (private, communal, state or open access);
- which rules are in use in Raika community with respect to animal resources; including whether the animal gene pool is conceived as private good or other intermediate tenure concept;
- comparing the local rules in use to the main international agreements (TRIPs and CBD).

1.4 Research Hypothesis

1. Property rights (PR) and Intellectual Property Rights (IPR) over natural resources comply with appropriation rules, which are resources and community specific, and that can be analysed according to the IAD framework;
2. PR & IPR on biological resources are part of a 'system' of 'local norms, constrained by ecological and socio-political uncertainties' (Meinzen-Dick and Pradhan, 2002:8-9).
3. Differences between local and international property rights regimes can be pointed out using a common tool for analysis.

1.5 Research Methodology

A survey of 70 interviews was carried out by the author in 24 villages selected in the area, during June and July 2003, in Pali district, Rajasthan, India. The semi-structured interviews have been codified in the format of a questionnaire, although not presented as such.

Two matrixes for data systematising have been drawn at the beginning, than completely rebuilt, after discussions with key informants. The matrixes includes the following major themes: herd composition, village livestock composition, selection responsibility and knowledge, ownership and access over animal genetic resources, slaughtering and sale, rules

about females, marketable products, marriage system, dowry and gift, future perspectives. Not all information is included in this draft.

Observations and participatory activities have been performed such as ranking exercises and social and physical mapping with key informants, group interviews (Waters Bayer and Bayer, 1994; Mhlanga, 2002). The teamwork involved a researcher and a translator who was trained in semi-structured interviewees and informed about the subject of investigation.

Raikas as well as other communities' members were interviewed to crosscheck information, and understand the interrelationships among groups for resource exploitation (Mc Cracken 1998). In order to collect data on a consistent format throughout the all survey, interviewed were visited more than once to verify the novel points and clarify the eventual obscure ones (Conroy, Thakur and Vadher 2002).

Information validation recognises flaws in the small work team and in the ignorance of the local language, which certainly constitutes the main limit for an outsider.

1.6 Raika Communities and Animal Resources

Desert covers 68 per cent of Rajasthan and represents 61 per cent of desert area in India. To the north-west is the Thar desert: arid, sandy, and far less productive than the land to the south-east (Geerlings, 2001). The western desert districts of Rajasthan are home to a substantial pastoral population belonging to diverse communities. Some like the Raika and the Gujar are specialised herders. Others practice a combination of agriculture and pastoralism. Rajasthan shepherds migrate according to two broad patterns of adaptations, one transhumant and the other nomadic. The nomadic herds mainly made of large numbers of sheep and camel, have evolved a pattern of mobility in which a substantial period of the year is spent on grazing in forest tracts of Madhya Pradesh or Uttar Praadesh. They return into Rajasthan, seeking pasture in hilly tracts and fallow lands (Agrawal, 1992; Kavoori, 1999).

According to Agrawal's findings as well as the author's qualitative observations, the proportion of sheep owners who migrate is around 35% whilst the proportion of animals who go to migration is far higher (90%) (Agrawal, 1992). Livestock in India is more evenly distributed than land resources. 'The rural poor and landless derive a higher share of their cash income from livestock than the better off segments of the rural population' (Indo Swiss, 2000: 103).

2. Legal pluralism

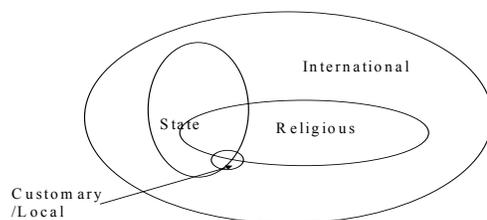
Rights need to be established to organise the access to the bundle of resources available in a particular area. Those rights, as part of the ‘legal systems’ in force, shape the people’s entitlements. Power relationships and hierarchical levels in the society will condition institutional arrangements and their effectiveness. The coexistence and interaction of multiple legal orders within a social setting or domain of social life is called legal pluralism (Meinzen-Dick and Pradhan 2002).

In Rajasthan, rights and duties, privileges and responsibilities, with respect to natural resources, refer to overlapping and interchangeable normative codes (Maeshwari, 2000).

As far as the value systems are shared amongst claimants, the interacting legal systems can be considered as a whole set of norms. As soon as the group is divided or grows, there is need for strongly codified norms or, on the contrary, greater flexibility of the codes. Thus, legal systems may overlap about relevant issues, interact in the definition of context specific rights, or perform a more or less conflicting existence. Dialectical relationships among rules and legal systems reflect relations among institutions (Allott 1980).

Such a dialectical relationship can be identified between statutory, religious and customary law systems (Figure 1) as well as between global and local levels (Meinzen-Dick and Pradhan 2002).

Figure 1 Legal pluralism



Source: Legal Pluralism (Meinzen-Dick & Pradhan 2002)

2.1 Legal pluralism for pasture

Examples of legal pluralism effects, with respect resources for livestock management, have been summarised.

In Rajasthan, land reform and the difficulties to re-arrange local institutions are pointed out in the following paragraph. in 1950s had the main objective of abolishing intermediaries, providing tenurial security to peasants and land to landless. Indeed, during the pre-

independence period, intermediaries such as the *zamindars* controlled 50-60 per cent of the land, owned by state. The peasants did not own land but did possess highly divergent inheritable usage rights. The strong patron-client relationship between the intermediaries and villagers was responsible for good management of CPRs without letting it seriously degrade, as it provided revenue to the proprietors and assurance to resource user groups through continued access to commons. A system of local government, called *panchayat*, replaced the intermediaries in 1955, under 'The Rajasthan Land Tenancy Act' (Torri, 2000). This created an institutional void, as far as the management of village commons was concerned. Where villagers did not managed to re-establish common property resources (*gochar*), private appropriations of the land occurred, thus disrupting local institutions. 'Property rights and land reforms were in principle meant to reduce inequalities, but ignored the assurance factor that discouraged users to participate in CPR management' (Sekar, nd :3).

Similarly, environmental protection for forest resources used to be exploited by *adivasi* (communities living in the forest), all villagers for timber, fuel, medicinal plants and Raika community in particular for livestock grazing purpose. The Forest Act (1970) in India prevailed as statutory law on the local users' rights on the forest. Later, corruption interfered in the mechanism of compliance causing heavier burdens to animal keepers. Corruption as customary practice prevailed on the statutory norms (Robbins, 2000). Even the access to *gochar* (common village land) is threatened through the establishment of nursery areas by officials of the Forest Department. The period of enclosure should be of about 4/5 years but a situation of 15 years of enclosure was recorded in Rajpura. Local organisations try to counteract the corruption circle and re-establish the right of access. Environmental legislation combined with corruption mechanisms in the forest department burdens the pastoralists production system. Consequently, the pressure from pastoralists on farmers is even greater due to the drastic decreasing of fodder sources (Agrawal, 1992).

While the sedentary Raika seek to maintain the stable relationship of the whole community and of the whole village, migrants have different rules and less concerns about the maintenance of good relationships. 'Mobility confounds settled relationship' (Agrawal, 1998 :23). When the transaction costs to achieve an agreement, such as a temporary right of use on a resource, migrants may decide to incur in the risk of a conflict and behave as 'free riders'. The production of externalities over a land they are passing by, damaging a crop, a nursery in the forest, is rarely going to cost them. However, in case of conflict, they could be worse off.

On the other hand, also the agricultural policy doesn't favour pastoralist. The dependence of farmers on pastoralist have declined due to the resort to chemical fertilisers. Intensification of cropping systems reduces the fallow periods and thus the access to the land (Agrawal, 1992). The free choice of the land owner does not take into account the needs of a social actor not having any power over him- the herder. This subtraction of economic benefit is also a subtraction in the number of option facing pastoralists (Bromley, 2000: 6).

People's behaviour are normally regarded as following or deviating statutory laws not considering the eventual compliance with other normative systems (Meinzen-Dick and Pradhan, 2002: 2). Consequently, to minimise the observer's bias, dialectical interactions can be better appreciated from an historical perspective¹.

Depending on the capability of social actors to use the norms (understand, comply with and communicate to outsider) the norms are forms of endowments, categorical or concretised assets. Depending on the observer's knowledge, norms in force can be ignored and not recognised thus depriving local people of their actual entitlements. Legal pluralism framework suggests a change in perspective which starts looking at the customary practices for access and control over the resources.

2.2 Legal pluralism and uncertainties

As consequences of this rules dialectic and dynamism, a pressure over AnGR have been exerted by political changes pursuing social welfare through land redistribution, environmental protection and agriculture supporting initiative. The extent to which local norms result particularly important (creating *sui generis* regulations) depends, according to Meinzen-Dick and Pradhan (2002: 8) upon 'four main uncertainties variables: ecological uncertainties, livelihood uncertainties, social and political uncertainties, and knowledge uncertainties'. Solving uncertainties, acquiring more knowledge about the context, means to gain a greater control and power over it reducing one's vulnerability.

Indeed, 'institutions are the result of human beings efforts to establish order to increase the predictability of social outcomes' (Ostrom and Ahn 2001:24 quoted in Bravo 2002: 7). Among institutions, local norms and customs increase in number and peculiarity as collective

¹ In 1823, James Mill, historian philosopher bureaucrat of the East Indian Company, wrote about the religious and political systems in India as obstacles to the regeneration of the society: 'By a system of priestcraft, built upon the most enormous and tormenting superstition that ever harnessed and degraded any portion of mankind, the Indians' minds were enchained more intolerably than their bodies; in short despotism and priestcraft taken together, the Hindus, in mind and body were the most enslaved portion of the human race.' (quoted in: Elliot 2000: 118-119).

attempts to reduce uncertainties. The closely woven net of social interdependencies creates reciprocal insurance against external variables. Beliefs and religious practices flourish as attempts to establish relationship with the deity and influence events (De Martino, 2003:7). The ‘jamangi’ or village system in India has been identified as a strongly structured and institutionalised social system (Dumond, 1967:213) where the role of reciprocity, specialisation (Srivastava, 1997) and long term relations are crucial to the community management.

With respect to the Raika community, all the uncertainties either ecological or social and political, involve the access to natural resources, complementary to livestock production. Furthermore, relevant to the Raika community, vulnerability, poverty and close dependence on an the resource for survival, facilitate collective action particularly in developing countries (Runge, 1986).

3. Collective action at the local level

‘The Oxford Dictionary of Sociology defines collective action as: “action taken by a group (either directly or on its behalf through an organisation) in pursuit of members’ perceived shared interests.” (Marshall, 1998). In situations where resource users come into regular contact and are able to communicate, negotiate, observe and learn to predict the actions of others, co-operation in the face of temptation to free ride is may be likely to occur (Ostrom, 1990). Such conditions do normally verify when the users group is small, since the users have better opportunity to develop reciprocal trust negotiate and monitor each others’ behaviour (Ostrom, 1990; Wade 1988).

In the analysis of the local situation, self-regulating groups for the sustainable management of animal resources have been identified and positive linkages between private and common properties have been pointed out.

3.1 Local management of natural resources

At Rajpura, one of the villages visited, the governmental *sarpanchayat* was actively involved in development and investments on village commons, thus users perform collective action. The traditional *panchayats*, pre-existent to the government one, continued working for the development of institutions endogenously.

The common and private resources the rights and duties of the village groups have been described with respect to land and animals. The dynamism of rights is pointed out at the occurrence of emergence situations.

The resources inventory includes:

- Common land resources: grazing land (*gochar*) and sacred groves, holy land (*oran*);
- Private land resources: agricultural land;
- Common livestock resources: village bull and village male-buffaloes. Also their shelters are common property;
- Private livestock resources: cows and female-buffaloes, small ruminants, other livestock.

3.2 Common land management

‘When different individuals hold rights to different resources that coexist on the same plot, we call this multiple tenure’ (Bomley, 2000: 374).

In Rajpura, the *gochar* is the result of a collective action by the villagers. It has been registered as village property following the villagers request to the local government. *Gochar* means land for grazing. In Rajpura, during the rainy season, the *gochar* can be closed to animals and used to grow trees generating a profit that is used for the whole village.

Livestock are grazed in the *gochar* during the winter and the summer. Cows and buffalo have the right to access to the *gochar* for two of weeks before small ruminants (more disruptive of the grass cover).

Dynamism in emergency situation: The lack of water, registered in the last three years in Rajasthan, has created conditions of extreme fodder scarcity. The village council has decided to open the *gochar* also during the rainy season in order to sustain the village livestock (and livestock keepers) though sacrificing the collective outcome.

The *oran* is a sacred grove, dedicated to the village deity and registered under the deity name. A collective renunciation takes place as spiritual practice for all the village welfare. The dry wood collected in the *oran* is sold and the proceeds spent to buy lamps for the God to which the *oran* is dedicated. Poor people are sometimes allowed to collect the wood for private use without considering it as a sin. ‘By not harvesting from these refugia, they serve as a source of regeneration to other nearby locations that are disturbed through harvesting (Ostrom, 1999: 36). The grazing land (*gochar*) and the holy land (*oran*) are normally adjacent.²

During the rainy season, although the fencing of agricultural fields the overall vegetation of the area provides with fodder the livestock population thus allowing migrants to come back and graze animals. For example it has been observed that the road side is on average 5 meters

wide (per side) providing in the length of 1 km of road about (10m*1000m =10,000sm) 1hectar of grazing land.

3.3 Private land management

Land suitable for cropping is owned by Rajput people who normally cultivate it once or twice per year. Rajput normally own cows and graze them on private land. Other livestock keepers have access to Rajput's land during the fallow period. Thus, although a hierarchical disparity between rights, the concept of "multiple tenure" (Bromley, 2000:13) applies also to private land.

Livestock keepers have the duty to provide the land owner with all the dung harvested in the corral. Landowner have the right of pre-emption for the village dung. During the dry seasons, the dung is collected and kept at the herders's houses. They put off the returns on that product waiting for their villagers (landowners) to buy it. This rule is still in force in small villages but considered obsolete in larger villages, more open to external contacts, where the community organises itself differently.

A new form of transaction that modifies social tradition and stands out as a market arrangement, consists of an herder acquiring the exclusive temporary right to graze on a fallow field during the rainy season.

Dynamic patterns take places in case of emergency situations, such as drought. In this case, Since farmers are limited in their choice for continuous cultivation by the climatic conditions, fallow lands are inevitably available for grazing. This natural factor limits the scope for power of landowner and creates a relative privilege for livestock keepers with respect to land resources, although dry and SPOGLIA.

3.4 Common livestock management

The village bull '*godha*', and the village buffalo bull '*padha*', are traditional institutions in Rajasthan. Their permanent shelter is called '*vadha*'. Those animals are common property of all the villagers not dependently on private cattle ownership. Every villager contributes to purchase the bull, to feed and health care and desires of having access to a good breed both for production and because good animals give status to the villagers³. Indeed, a good bull is normally too expensive to be purchased by a single family (10,000Rs). The right of use this males for breeding is unconditional for all the villagers. This practice is still intact due the

² The same evidence is better shown in an other paper of this panel and in Agrawal, 1998.

³ The animal selected as the village bull is defined the son of the sun with highly probable reference to the arian race.

holiness of the bulls. Access for mating is allowed to outsiders who pay in kind or in money to fodder or sweets for the bull. The payment may not be required if the person is poor. However, a rule dynamism consists of only the cows or buffaloes owner contributing to the purchase the bull.

3.5 Private livestock management

All small ruminants are private goods. Ram and buck goats are shared subjected to personal relationships. Costs for these animals are born by the owners (purchase, feeding, health care) whilst benefits are shared among owners and users (the reproductive resource is borrowed to other herders). Responsibilities for the maintenance of the resources are assigned to each user who temporarily contributes to the feeding expenses. Part of the costs and part of the benefit of small livestock production stream onto the common property resources, respectively through grazing fodder (common cost) and spreading manure over the pasture (common benefit).

3.6 Collective management of private livestock: chopa gwal and gowsala

The *chopa* system is an institution for collective action to manage private and common resources. The *chopa* (four legs) means that all the cattle and buffaloes go to the *accria* (main square of the village) and then go for grazing starting every early morning and coming back to the *accria* around 5,30-6 p.m..

The *chopa* is normally managed by a *gwal* or *gori* (village herder) the person in charge of taking the animals to the near pastures and looking after them during the day. The *gwal* is paid by the cow and buffalo owners per month, in kind or money. The price for the buffalo is normally higher due the relative difficulty in herding⁴.

The seasonality of the *chopa* system goes in parallel to the agricultural one⁵. In every village there is need of a *gwal* for 3 to 10 months per year depending on the water availability. In Godwar area the *gwal* belong to the Raika community because they are believed 'the best herders', knowing about land ownership, and animal health care.

Large ruminants management is a hybrid of private and public. 'Free rider' problems occur when people send their animals to the *chopa* without paying their share, ignoring the *gwal*'s work. In Rajpura, problems of this kind caused the retirement of a *gwal* and the worsening of

⁴ The *gwal* is paid 3 kg wheat per month per buffalo; 2kg per cow.

⁵ **Rainy season:** time for cropping so that the land is occupied by crops - animals excluded. The *chopa* system starts in order to organise the animals to graze on common areas instead of grazing on the fields. **Winter:** land

the management condition for all the villagers' cattle. Normally the Raika people of the village take turns to work as *gwal*, even when the payment is low.

Another institution for collective management of private and common resources is the the *gowsala*, the collective shelter where non productive cattle and productive ones during drought periods, are brought at an inter-village level (Rathore *et al* 2002). The *gowsala* are open also to other holy animals like ram and goat bucks *amar*. This activity is organised by Jainist (religious group) and supported by the government.

4. Institutional Analysis and Development framework

The Institutional Analysis and Development (IAD) framework, consider resources, community and rules in use as the main elements affecting the pattern of interaction among individuals. The framework stands on a series of experiments presented by Ostrom (1999) demonstrated that 'individuals have the capability to engage in problem solving to increase the long term payoff, to make promises, to build reputation of trustworthiness, to reciprocate trustworthiness with trust, and to punish those who are not trustworthy'(Ostrom, 1999:18). The consequent foundation for public policy is that humans, although not analysing all situations fully, (bounded rationality) will try to solve complex problems through the design of regularised procedures, particularly reciprocity (norm using behaviour). (Dequech, 2001) The aim of the IAD is to identify those interrelations between social and institutional factors which can create incentives for sustainable resource management.

This framework has found its major application in the study of common resources management⁶. Here it will be applied to animal genetic resources which, as it will be pointed out, are conceived according to multiple forms of intermediate tenure. Animal genetic resources management seems interestingly dependent on the level of collective action which is already in place, used to be, or could be facilitated in a given area.

Seven clusters of rules have been identified as directly affecting the components of the action situation: boundary, position, authority, scope, aggregation, information, and payoff rules.

1. "*Boundary* rules set the entry, exit, and domain conditions for individual participants.
2. *Position* rules establish positions, specify procedures by which participants are assigned into positions, and define who has control over tenure in a position.

may or may be not cropped depending on the abundance of water received during the monsoon. **Summer:** no *chopa* because the land is left fallow due to water scarcity. Use of private land for grazing.

⁶ See Ostrom 1999

3. *Scope* rules specify which outcomes can be affected and set the range within which these can be affected.
4. *Authority* rules prescribe which positions are authorised to take which sets of actions and how a series of actions are ordered, processed, and terminated.
5. *Information* rules affect the information individuals have about the structure of the situation by establishing information channels, stating the conditions when they are to be open or closed, creating an official language, and prescribing how evidence is to be processed.
6. *Aggregation* rules affect control by prescribing the formulae for weighting individual choices and calculating collective choices at different points in a process.
7. *Payoff* rules prescribe how benefits and costs are to be distributed to participants in positions given their actions and those of others. “Instead of conducting such a complete analysis, appropriators are more apt to use their intuitive understanding of the resource and each other to experiment with different rule changes until they find a combination that seems to work in their setting.” (Ostrom, 1999:19)

5. Rules in Use for Animal Genetic Resources at the local level⁷

The rules in force for livestock management in the Raika community have been analysed according to the IAD framework. A synthetic representation is provided below (Table 1).

Livestock have been distinguished in four groups: small ruminants females, small ruminants males, cow and buffalo bull; cow and buffalo females.

⁷It is fascinating to investigate the rules of Rajasthan that is ‘the land of the *rajahs* (kings or rulers)’.

Table 1. Rules in use for Animal Resources in Raika Community, Rajasthan

RESOURCE RULE	Small ruminants females	Small ruminants males	Cow and buffalo bull	Cow and buffalo females
Boundary	X*	X	X	
Position		X	X	
Scope	X	X	X	X
Authority				
Information		X	X	
Aggregation	X	X	X	X
Payoff		X	X	

Source: own elaboration * (X indicates that the typology of rule is present)

5.1 Small ruminants

Boundary rules, set through religious norms, have been identified as limiting the access to sheep and goat breeding activity.

The first example is the rule of prohibiting the sale of female animals out of the Raika caste. Through this rule, females are protected from being killed (declared purpose of the rule).

Political and economic aspects emerge from this norm. First, members of other communities are prevented from starting the activity of animal breeding. Second, females are maintained inside the flock as renewable production resources. Particularly in emergency situations, this rule helps to prevent financial collapse creating a membrane to filtrate access but also to control flows of capital outwards.

The *boundary rules* in force for male animals state that ram and goat bucks can be borrowed and lent for short period to people of any caste depending on the personal relationships.

A stronger limit to the access to genetic animal resources applies to those animals selected as *amar*⁸. No *amar* can be exchanged for long periods out of the Raika community due to its religious significance (Srivastava, 1997).

Rules dynamism: Both the rule of ‘female sale’ and ‘*amar* lending’ are changing in the Raika society. Although still valid, these traditions are loosing their significance. A measure of the dynamism is given by the fading of the punishment. Five years ago punishment for the sale of a female to outsiders was proportional to the amount of money gained from the transaction (as a reimbursement to the community); now most of the respondents say that female are sold (at night) and no punishment is paid. Traders arrive in the villages and collect the livestock.

⁸ Having “*amar*” sheep is part of the social status of Raika. In Godwar area, *amar* is normally the best male in the herd. It is born during the last day of Punam (14th day of each hindi month when it is full moon) or during Amawash (the 30th day of each hindi month when there is no moon) or on Monday and it animal is devoted to

People do not blame rule-breakers since these are difficult times due to water and pasture scarcity.

Position rules are related to the role of the owner. He is in the specific positions of dedicating the animal to God, and defining who has access to the animal (borrowing). The responsibility of the owner extends till the animal's natural death. At the end of its activity it is castrated and kept at the owner's herd. It is not left free for preventing it from being slaughtered⁹. The Raika borrower has the privilege to use *amar* and the responsibility to maintain it healthy.

Scope rules: no money can be gained through the *amar*¹⁰ and not to any *animal for breeding*. A dynamism was registered since two of the interviewed referred to have asked for money to foreigners borrowing a ram or a goat buck.

Scope rules specify that females cannot be slaughtered. Killing and eating a female is a sin due to the high level of respect that the Raika community, as well as to other communities in India, grant to females.

Aggregation rules in the form of collective consumption of genetic resources include a *payoff* mechanism: the user's contribution to feeding (ghee, oils, sweets and fodder).

Several *aggregation rules* are identifiable in the management of common property resources. Raikas' survival strategies without migrating consist of reducing the number of heads and selecting local, well adapted breeds as base for eventual crossbreeding. Exceeding the number of animals means challenging the carrying capacity of the resources available. During the interviews no rule emerged related to the number of animals allowed for sedentary Raika families. Nevertheless, the restriction in appropriation for alpine pastoralists in Aosta Valley (Italy), (as indicated in Bravo, 2002), finds a logical application in the context of Rajasthan. The Italian rule 'don't bring to the common meadow more animals than you can winter' would be translated as 'don't bring to the *gochar* more livestock than you can feed during the summer', the summer (October/May) being the most dry and critical period for animal survival. During the dry months, pastoralists need to integrate grazing with extra fodder such as straw, grains, local seeds, milk, buttermilk, oil and ghee. Each herder, depending on the family labour and the access to forest area and to money reserve, adjusts the number of animals to be grazed in the *gochar*.

Shiva. The definition of the most of the Raika interviewed is that it 'cannot be sold'; being a religious word, *amar* means: 'who cannot be killed'.

⁹ For explanation of the religious significance of the *amar* see Srivastava 1997: 132/133.

¹⁰ Normally, Raika control inbreeding by selling males after two or three years. In case of *amar*, it will be given for two or three years to another Raika before being returned to the original owner.

Aggregation rules establish a time for the resource appropriation as specified in the previous section with respect to small and large ruminants accessing the common land (see 3.2).

Aggregation rules establish that, in case of huge losses or new starting activities, the community members can intervene helping the persons in difficulty giving animals (normally 1 each contributor); there is no duty to give back the gift. The beneficiary may reciprocate this favour to others in the future and has the duty not to sell the flock for a certain period (indicated from 1 to 4 years).

For the selection of AnGR *authority rules* apply to the selection of the common bull where the most knowledgeable people are invested with this right of choice.

5.2 Large ruminants

No *boundary rules* to the purchase of a cattle have been identified in India except that of respecting the national boundary not selling cattle to Pakistan where these animals can be used for human consumption. Through this rule they are protected from being killed because they are considered holy in India.

Examples of *aggregation rule* are the institutions of *godha* common bull and *padha* buffalo bull, above described and for which there is a *payoff* mechanism.

For the bull as for the *amar*, *position and scope rules* are related to the role of the owners and are the same as for the *amar*. The common bull can be left free without risk since it is recognised through a symbol (Ψ) indicating that it is devoted to Shiva and protecting him from being turned out of cultivated fields!

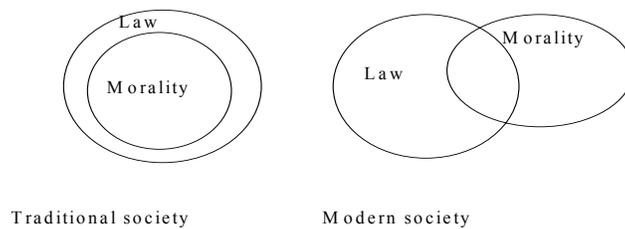
Dynamism of the rules Since the economic importance of the common bull has decreased with respect to buffalo, its significance to community is also fading. On the other hand, private buffalo bulls are widespread and represent a good business for some farmers. The payment is 100 rupies per successful mating and the activity lacks religious significance.

With respect to control over animal genetic resources, old people referred that, the son of a village bull could not be used in the same village. The rule was strong in the past but due to lack of interest and a weaker role of the community oldest members, the son can now be used.

According to Allott (1980), such dynamism can be interpreted looking at the dialectical relationship between 'at least a thesis (the law system), an antithesis (other normative systems)' taking place in each society. As origin of the terms, *ius* referred to religion, gives the etymology to justice and jurisprudence, similarly, *mos* (mores, customs) gives the root to morality. Theses and antithesis can be mutually enforcing, indifferent to each other or

contrasting. The dialectic varies with the issue and the society over time and model of development as represented in Figure 2 (Allott, 1980: 25).

Figure 2. The dialectic between Law and Morality



Source: The limits of Law (Allot 1980)

6. Rules in Use for Biodiversity at the international level

Having considered institutions and rules in use at the local level for animal resources management, the same analysis has been applied to the international institutions implementing norms for genetic resources management. The hypothesis is that a common approach may help to point out some key insight into the local/global legal pluralism.

Customary norms are the primary source for international law, although the so called 'particular international law' is mainly constituted of agreements. An agreement is subordinated to customs as a contract is subordinated to law (*pacta sunt servanda*). International law applies to state communities and consists of a pool of norms that the state accepts to comply with. However, it doesn't rule only the relationships among states but also those internal to state communities and obliges the states to translate international norms in internal ones. Rules for economic, social, commercial relationships represent the most significant shares of international laws (Conforti, 1996).

The Convention on Biological Diversity (UNEP, 1992) and the TRIPs Agreement (WTO, 1993) have been briefly discussed as basic documents of the legal system with respect to biodiversity issues. The first difference between the two documents concern the stakeholders: the state in the CBD, the private agent in the TRIPs agreement; and the good protected: biological diversity and its components in the CBD, the commercial privilege in the TRIPs agreement. The table below (Table 2) summarises the types of rules individuated in the two documents.

Table 2. Rules for genetic resources at the international level

Source of law	TRIPS	CBD
RULE		
Access	X*	X
Position	X	X
Application	X	X
Authority	X	X
Information	X	X
Aggregation		X
Payoff		X

Source: own elaboration *(X indicates the the presence of a type of rule)

6.1 CBD

The CBD objectives are listed in the Art.1: ‘conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources’. Furthermore objectives relate to appropriate ‘access to genetic resources’, ‘transfer of relevant technologies’ and ‘funding’, ‘taking into account all rights over those resources and technologies’.

Art.3 is an *authority rule*: it confirms the sovereign right of the state, in harmony with United Nations and the international legislation principles.

An *application rule* is in the art.4 defining limits for application of the Convention: ‘in areas within the limits of the national jurisdiction of each contracting party for the components of biological diversity and beyond such limits in cases of processes and activities carried out under the contracting party jurisdiction’.

Aggregation rules are numerous and key for the pursuing of objectives. Aware of the problems related to biodiversity management, the international community emphasises the need for co-operation (cfr.art.5). Co-operation is established in ‘developing educational and public awareness programmes’ (13.b), introducing procedures that require ‘environmental impact assessment’ allowing, ‘where appropriate, for public participation in such procedures’ (14.a); promoting exchange of information on activities which are likely to adversely affect biodiversity (14.c,d).

Position rules relate to the contracting party accepting to exert its national sovereignty developing plans and programmes for conservation and sustainable use of biodiversity and integrating plans and programmes for conservation and sustainable use of biodiversity (Art.7). The *position* of the state is to protect genetic resources as well as another social good: local communities (Art.8). Rules establishing positions and procedures for the control over resources are at the artt.8, 9, 10 11 e 12.

Attention to local communities is expressed in the *payoffs rules*: each contracting party has to ensure that the biological diversity costs be considered in the formulation of plans and programmes, (14.b); the conference of the parties has to examine liability for damage to biological diversity and set compensation and restoration to be paid (14.2).

Access rules relate either resources (art.15) or technologies, including biotechnology (art.16). Art.15.1 defines that the *authority* determining access to genetic resources is the state.

Each contracting party shall facilitate other contracting parties to access genetic resources and apply environmentally sound measures (15.2). The access is ruled by the Convention (15.4) and includes a prior informed consent of the Contracting party providing the resource (15.5).

Each member undertakes to provide or facilitate access to technologies that are relevant to the Convention objectives to other Contracting parties (16.1), especially to development countries (16.2) and sets measures to develop their private sectors (16.4).

Information sharing (15.7), benefit sharing (15.6) and raw material suppliers involvement in research activities (15.7) represent payoff rules or reciprocity mechanisms. They spring out of an idea of co-operation, limiting the authority of the Convention and emphasising the state sovereignty (16.2,3,5).

6.2 TRIPs Agreement

Section 5 of the TRIPs agreement is that related to patents and refers to plant and animal genetic resources, stating that each signatory country has to provide itself with an intellectual property law (Art.27.3).

An *access rule* states (Art.27.1) that patenting is available “for any invention whether products or processes, in all fields of technology, provided that they are new, involve an inventive step and are capable of industrial application”.

Authority, *application* and *position* rules represent the main categories of the agreement. Position and authority rules emphasise the patent owner and his/her rights. In the TRIPs agreement the role of a state is heavily limited in its sovereignty and let the international authority to intervene.

With respect to *applicability*, art.27.1 specifies that patentability is applicable to all the signatory countries, “without discrimination as to the place of invention, the field of technology and whether the products are imported or locally produced”.

The state *authority* is constrained by the article 27 (27.2 and 27.3) which starts as: “Members may exclude from patentability” “unless such exclusion is made merely because the exploitation is prohibited by their law” (art.27.2). The state can exercise its authority in

denying access to patent regime for a) diagnostic, therapeutic and surgical methods for the treatment of humans or animals; b) “plants and animals other than micro-organism and essentially biological processes”; however members shall provide for the protection of plant varieties either by patents or by an effective *sui generis* system or by any combination thereof” (art.27.3).

Art.28 specifies a *position rule* highlighting the exclusive right of the patent holder to transfer, assign or temporarily license his/her right, subject to limited exception (Art.30).

Art.31 states the signatory member’s authority, prejudging the legitimate interest of the patent owner (art.30), of authorising others to utilise the patented invention. However, the sovereignty fit of the state is limited in several ways. The authorisation agreed by the state shall be limited to the purpose of authorisation (31.a) and shall be reviewed over the time for deciding either to terminate (31.g) or to maintain authorisation (31.k). The state can waive to obtain the authorisation by the right holder only in the cases of a national emergency, extreme urgency or non commercial use (31.b).

Two *position rules* specify that the person authorised by the government for patent utilisation, has to have made efforts over a reasonable period of time to obtain authorisation by the patent owner. (31.b). His/her right will be non exclusive and non assignable (31.d,e). The patent owner has the right to be paid adequate remuneration (31.h) taking into account anti-competitiveness conditions (31.k).

Application of authorisation has to be limited in duration and scope. Furthermore, only domestic market can be supplied (31.f), unless the occurrence of anti-competitiveness conditions. In such cases, the main good is the market, not the private agent.

Other *authority rules* constrain the national sovereignty. Indeed, the legal validity of any decision relating to any authorisation or remuneration provided “shall be subject to judicial review by a distinct higher authority in that Member” (31.i,j).

Where the use of the first patent is for a “second patent” the *access* is agreed to an important technical advance of considerable economic significance (31.l, (i)). The *position* protected is that of the first patent owner which shall be entitled to a cross licence (31.l(ii)).

Information rules are specified in the art.29 of the TRIPs Agreement. Any applicant for patent shall disclose sufficiently clear and complete information for the invention to be carried out by any person skilled in the art.

Patenting requires the absolute secrecy of *information* before the patent is assigned. With respect to genetic resources, one of the components whose importance has been pointed out is the indication of origin of the raw material to allow for an equitable sharing of benefit (Art 39

undisclosed information). Art.34 indicates that, when a process to obtain a product is under patent protection, the defendant has to prove that the process to obtain an identical product is different from the patented one. In this respect, many traditional varieties, if patented, may belong to the private domain not being available a systematisation of the evolutionary process for their constitution.

In the TRIPs Agreement there are no *payoff rules*; showing that the acknowledgement of private property (*Recognising that intellectual property rights are private rights*, first page, TRIPs Agreement) includes the acknowledgement of a further intrinsic value of such property as inherently good to society, such as it doesn't need to be mitigated through sharing mechanisms or payoff rules. The underpinning assumption is that a well functioning intellectual property regime generates an appropriate environment for technology transfer and investment.

It has been pointed out that in the TRIPs Agreement the *aggregation rules* are also absent: co-ordination among different economic actors is not stated nor recognised as for example the key role of the providers of raw material. Thus the agreement fails to recognise the farmers or herders contribution to the realisation of a genetic resource through selection, in situ use and conservation, maintaining either the place of origin or the resources and of their environment.

7 Animal Genetic Resources: local vs global

7.1 Technological divide

A crucial disparity between the local and global approaches springs out of the different technological tools used to access to the resource: paradoxically the global society (macro level) looks at the micro structure (genotype, Animal Genetic Resources) whilst the local observer looks at the macro structure (phenotype, Animal Resources).

The Rajasthan pastoralists seem to conceptualise this distinction with a single term independent of animal species and indicating male animals for productive purposes – ‘Saand’. Saand, (sheep, goat, cattle, buffalo) may have religious value (godha= holy bull, padha= holy buffalo, amar= holy ram or buck goat) and are protected by rules preventing them from sale or from being slaughtered.

At the local level, AnGR are part of the assets portfolio of a household. Depending on the entire portfolio options, AnGR are more or less crucial in the livelihood strategies towards a

sustainable well being (Dorward *et al* 2001). This also applies at the global level where, given that the entire portfolio of endowments, AnGR is decreasing and it has become crucial to maintain diversity at, at least, its present status (Seedling Solution 2001).

7.2 *Private /common divide*

At the local level, it has been noted how the village community sovereignty over common resources is integrated with the private rights of community members through the creation of rules and institutions for the common use of private resources.

The TRIPs Agreement identifies private property and free exchange as goods of higher value than the state itself, basic component of any international law system. Indeed, the idea of sovereign state, emphasised in the CBD, is limited in the TRIPs agreement.

An example of negotiation of PR for natural resources is provided by the North Sea property rights attribution. The rights were established with the Convention on the Continental Shelf in Geneva 1958, in order to distribute them among the bordering countries. When oil and gas reservoirs were discovered there was no dispute about the property rights on them. Moreover, the existing Property Rights had encouraged the investments, in the oil and gas exploration that would not have occurred in case of uncertain ownership over the resources (Barzel, 1989).

Nowadays, the increasing value of natural resources and the disparity of institutional powers, combine in limiting state property rights for natural resources and considering them as part of the public domain available to privatisation and commercial exploitation.

7.3 *Market divide*

For the selection of the village bull (*godha*) the most knowledgeable people in the village are given a mandate of purchase. They perform an highly specialised task offered to God and invested for the common benefit of the community. Their knowledge is an intellectual valuable good acknowledged by all the member of the community although not remunerated. It is individually owned but collectively enjoyed: once the animal resource has been selected, the access to it is open to villagers while the payoff for outsiders is proportional to the resource use, and spent for its maintenance.

At the international level global market competitive arrangements requires the establishment of mechanisms to remunerate the research (Swanson, 2002). The knowledge developed has a cost and the investors ask for remuneration. Investing in research and development has the

purpose of keeping ahead in the arm race of technological development thus gaining a competitive advantage in the market (Dutfield, 2000).

As pointed out in the TRIPs analysis aggregation and payoff rules are not emphasised. The 'raw resources' provided by the natural environment are accessible to everybody and the global actors, not being subjected to the social control of a small community, do not pay the 'maintenance fee' normally paid by local users. The global user configures as a 'free rider'. "unless the number of individuals is quite small or some other special device to make individuals act in their common interest, rational, self interested individuals will not act to achieve their common or group interests (Olson, 1965:2).

The Protection of Plant Varieties and Farmers' Rights Bill, 1999 includes paragraphs on benefit sharing and on rights of communities. It is specified that a share of the benefit accruing to the breeder of a new variety may be claimed by persons, organisations or community (or somebody on behalf of these communities) which contributed to the evolution of the variety itself. The Authority constituted by the Government will analyse the claims and decide whether to grant any compensation. The compensation will depend on the nature of the use of the genetic material by the claimant and the commercial utility and demand in the market of the variety and will be deposited by the breeder in the gene fund constituted under the act (Narayanan 2001:388-389). However, the user's contribution is still subjected to the community claim.

7.4 Innovation strategies

In the Raika communities 'new' breeds are continuously introduced by the migrants, particularly small ruminants going to migration. New breeds derive from more favourable areas where animals are more productive. Sedentary Raika keep the new breeds in marginal conditions and test their productive performances orienting future choices on the basis of the outcomes of their experiments. The same principle has been encountered in Africa for plant varieties (Ngambeky and Wilson, 1983)

Raika pastoralists deserve to be mentioned as innovators due to their continuous individual research for the best animal. It has been verified that they are able to explain clearly the genotype/environment interaction producing the phenotype $[P=G*E]$. Their attempts are at extracting productive traits out of the 'new' breeds and transferring them to the local animals; they are able to remember the animals and the breeds used for many generations although the frequency of ram exchanges taking place between herders makes it difficult to individuate them. At a community level, the individual processes and choices are identifiable as

behavioural trends that include different actors and phases of selection (migrants, sedentary people) and appear as randomised sets of crossbreeding. Where individual repeated choices are identified, it is possible to intervene consciously in community patterns (FAO, 1997).

In the ‘analysis of innovation strategies and industrial differentiation through patent application for plant biotechnology’, Joly and de Looze (1996) noticed a low level of technological differentiation being strictly related to weak appropriation regimes. Vertical integration seems to be preferred to intra-sectoral co-operative behaviour among trans-national groups thus generating oligopolies. According to the French researchers, the low technological differentiation appears in contradiction with the function/ability of the patent system to co-ordinate firms’ plans. Industries should have access to detailed information on technological innovation that they have to compete with (Abraham and Moitra 2001)

With regard to plant biotechnology, the convergence of research programmes could be seen as a strategic form of co-operative behaviour including the limitations to innovation in order to cover the research costs and share the market benefits in a longer run. Example in the semiconductor industry are elaborated in (Stadnick, 2002). Indeed, patent systems take into account the trade-offs between the requirements of a perfectly competitive market and those of an incentives demanding R&D private sector. (Swanson and Golsh 2000).

Thus, cartel strategies involve not only the price but also the technique. At date, no institution seems to be able to intervene over this asymmetric information and reduce the transaction costs it produces (Swanson and Golsh, 2000).

Conclusion

The local institutions in genetic resources management have been investigated with respect to rural areas of Rajasthan and in particular to the Raika pastoral community.

Private and common property regimes as well as institutions for the common management of private resources have been discussed. The analysis has pointed out that different property regimes interact with their respective strengths to shape people’s entitlements.

Rules are established according to power relations and are dynamic over time. Small groups of resource users at the local level have performed good attitudes towards collective actions whilst large groups at the international level have shown a greater difficulty in acknowledging and enforcing strategies for collective actions.

Technology, market and innovation stand out as crucial factors in the attribution of property rights and in the creation of opportunities for resource conservation and sustainable use. The

conceptual difference between animal genetic resources and animal resources has been described as dependent on the technological level of understanding and using it. The market levels have been focussed as determining the need for knowledge remuneration and the enforcement of the user's payment practice. Finally, innovation strategies have been compared between the local and the international level, the latter emerging as more constrained by rent seeking behaviours.

Thus, the research hypothesis have been verified and accepted as true.

References

- Abraham P, Moitra S (2001) *Innovation assessment through patent analysis* Technovation 2001 1 (4): 245-252
- Agrawal A (1992) The grass is greener on the other side: a study of Raikas, Migrants Pastoralist of Rajasthan International Institute for environment and development Paper 36
- Agrawal A (1998) Greener pastures Oxford University Press
- Allott A (1980) The limits of Law Butterworths, London
- Barzel Y (1989) *Economic Analysis of Property Rights* Cambridge University Press.
- Bravo G (2002) Environment, Institutions And Society In The Management Of Common-Pool Resources: Linking Iad Framework With The Concept Of Social Capital
- Bromley D, Sjaastad E (2000) *The prejudices of property rights: on individualism specificity and security in property regimes* Development policy review 18 (4): 365-89
- Conforti B, (1996) *Diritto internazionale* Editoriale Scientifica Milano
- Dequech D (2001) *Bounded rationality, institutions and uncertainty* Journal of Economic Issues, Dec2001, Vol. 35 Issue 4, 911-930
- De Martino E (2003) *Sud e magia* Feltrinelli, Milano
- Doward A, Anderson S, Clark S, Keane B., Moguel J. (2001) Asset functions and livelihood Strategies a framework of pro-poor analysis, policy and practice Contributed paper to EEAS Seminar on Livelihoods and rural poverty.
- Dumond L (1975) La civiltà indiana e noi, 1996 Adelphi Milano.
- Dutfield G (2000) Intellectual Property rights, Trade and Biodiversity Earthscan Publications, London
- Elliot T (2000) *The rise and the fall of the British Empire* New York Publisher
- Geerlings ECL, (2001) Sheep husbandry and Ethnoveterinary knowledge of Raika sheep pastoralists in Rajasthan, India MSc Thesis in: Environmental Sciences. Supervisor: Prof. Dr. Akke van der Zijpp disponibile sul web <http://www.pastoralpeoples.org/docs/eg02abstractcontents.pdf> consultato in marzo 2003
- Government of India, (2000) Protection of Plant Varieties and Farmer's Rights Act
- Indo-Swiss Cooperation, (2000) Capitalizing on experience in Indo-Swiss cooperation in livestock development in India Intercooperation, Bern.
- Joly PB, de Looze MA (1996) *An analysis of innovation strategies and industrial differentiation through patent applications: the case of plant biotechnology* Research Policy 25 (1996) 1027-1047
- Kavoori PS, (1999) Pastoralism in Expansion: The Transhumant Herders of Western Rajasthan, Oxford University Press, Delhi.
- Knox McCulloch A, Meinzen-Dick R, and Hazell P, (2001) Property Rights, Collective Action Technologies for natural resource management: a conceptual framework. IFPRI <http://www.capri.cgiar.org/pdf/capriwp01.pdf>
- Maheshwari SR (2000) *Local Government in India* Lakshmi Narain Agarwal

- McCracken Rietbergen J, Narayan D (1998) Participation and social assessment The International Bank for Reconstruction and Development The World Bank Washington, D.C.
- Marshall, 1998 The Oxford Dictionary of Sociology
- Meinzen-Dick RS, Pradhan R (2002) Legal Pluralism and Dynamic Property Rights CAPRI Working Paper no.22 CGIAR Systemwide Program on Collective Action and Property Rights
- Ngabeky DW, Wilson GF (1983) *Moving Research to farmers field* IITA Research Brief 4 1,7-8
- Olson M, (1965) The logic of collective action Harvard University Press Cambridge Mass
- Ostrom E (1999) Coping with tragedies of commons Workshop in Political Theory and Policy Centre for Study and Institutions Population, and Environmental Change Indiana University Bloomington, Indiana Annu. Rev. Polit. Sci. 1999. 2:493-535
- Rathore HS and Kohler Rollefson I (2002) Indigenous Institutions of managing livestock genetic diversity in Rajasthan India. In Livestock Breeds for Sustainable Rural Livelihoods (57-67) Lokhit Pashu-Palak Sansthan, Sadri
- Robbins P (2000) The rotten institution: corruption in natural resource management Political Geography 19 (2000) 423-443
- Runge CF, (1986) Common Property and Collective Action in Economic Development, *World Development*
- Sekhar NU (nd) *Institutional change and collective action: common property regimes in the semi-arid region of Rajasthan, India* <http://www.indiana.edu/~iascp/Drafts/sekhar.pdf> accessed June 2003
- Srivastava VK (1997) Religious renunciation of a pastoral people Oxford University Press, Delhi
- Srivastava VK, (1999) Some characteristic of a herding caste of Rajasthan In Human Ecology Special Issue, 7 303-319
- Stadnick C (2002) *Standard Setting Organisations: Answer To The Tragedy Of The Anticommons?* http://www.law.upenn.edu/fac/pwagner/ideas/stadnick_paper.pdf
- Swanson T, Golsh T (2000) Property rights issues involving plant genetic resources: implications of ownership for economic efficiency Ecological Economics 32 (2000) 75-92
- TRIPS (1994) Annex Ic del Marrakesh Agreement Establishing the World Trade Organisation, firmato a Marrakesh il 15 aprile 1994. Disponibile sul web, consultato in dicembre 2003 www.wto.org/english/tratop_e/trips_e/t_agm0_e.htm
- Torri M (2000) *Storia dell'India* Editori Laterza
- UNEP, (1992). (United Nation Environment Program) Rio Declaration World conference on Environment and Development United Nation Environment Program, Brazil.
- Wade R, (1988) *Village Republics* Cambridge University Press, Cambridge
- Waters-Bayer A. and Bayer W (1994) Planning with Pastoralists: PRA and more – a review of methods focused on Africa Eschborn: GTZ
- Ziedonis RH (2003) When the Giants' Shoulders are Crowded: Fragmented Rights and Patent Strategies in Semiconductors Industry University of Michigan Business School <http://www.isnie.org/ISNIE02/Papers02/ziedonis.pdf> accessed May 2003