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# Agricultural Landscapes as World Heritage: Raised Field Agriculture in Bolivia and Peru

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## **Keywords**

South America, historical ecology, landscapes, indigenous knowledge, agriculture, raised fields

## **Disciplines**

Agricultural and Resource Economics | Anthropology | Archaeological Anthropology | Food Studies | Social and Behavioral Sciences | Social and Cultural Anthropology | Work, Economy and Organizations

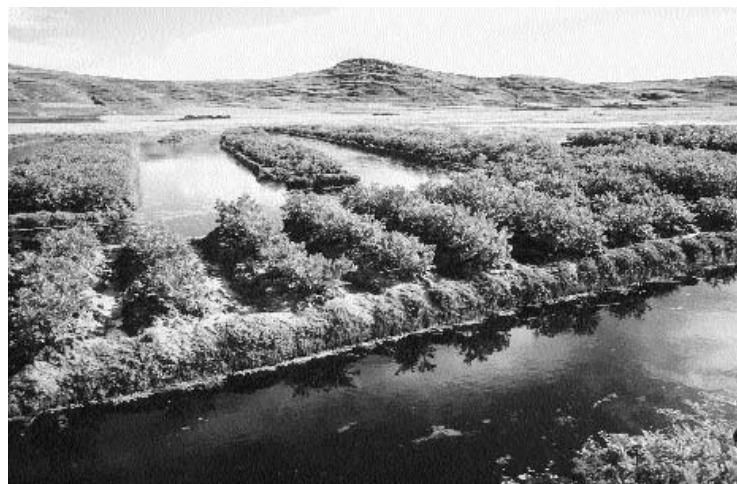
# Agricultural Landscapes as World Heritage: Raised Field Agriculture in Bolivia and Peru

Clark L. Erickson

**A**S AN ARCHAEOLOGIST WHO STUDIES agrarian landscapes of the past and present, I am concerned about the low value placed on cultural landscapes by national and international agencies charged with promoting, protecting, and managing cultural heritage in the developing world. My research in Bolivia and Peru focuses on a particular class of unappreciated cultural landscape, the mundane, traditional agricultural landscape (Fig. 1).<sup>1</sup> It is difficult to convince governments, international development agencies, conservation groups, funding institutions, and my archaeology colleagues that this class of cultural heritage is important and worthy of attention. In contrast to cultural landscapes associated with traditional monuments, important buildings, archaeological sites, and sacred natural features, the very characteristics of agricultural landscapes work against their receiving attention and protection. Most traditional agricultural landscapes are (1) cultural, in that they “exist by virtue of . . . being perceived, experienced, and contextualized by people” (Ashmore and Knapp 1991:1); (2) large scale, usually covering entire regions; (3) without clear boundaries; (4) products of a long historical trajectory (Denevan 2001; Piperno and Pearsall 1998); (5) heterogeneous (Crumley 1994), resilient (McGlade 1999), engineered (Lansing 1991), and highly patterned (Erickson 1996); (6) increasingly “contested” (Bender 1998); (7) dynamic,

*Figure 1*

Rehabilitated pre-Columbian raised fields, a class of traditional agricultural landscape, on the lake plain near Huatta, Peru, 1986. The earth platforms (5 m wide and 50 cm high) are planted in potatoes. Photo by Clark L. Erickson.



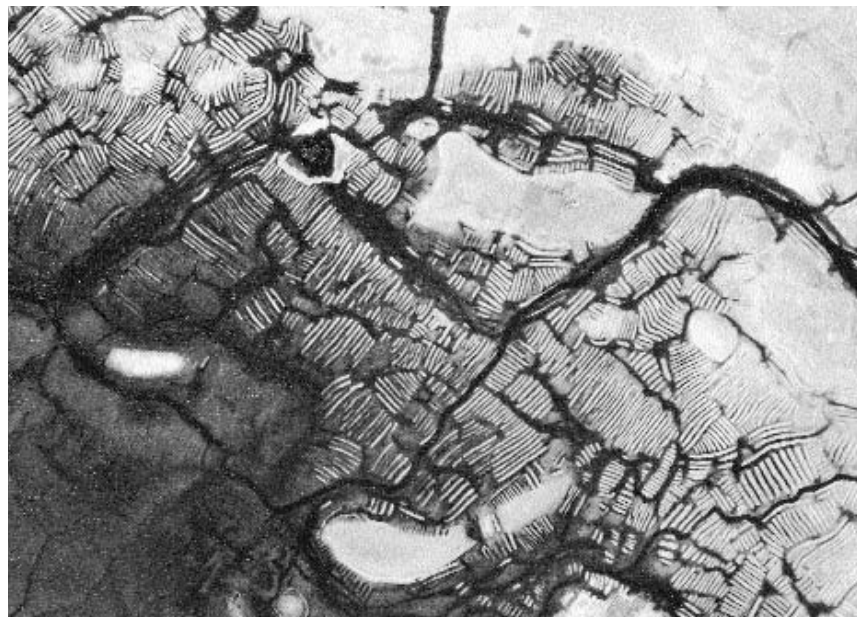
that is, continuously under construction and transformation (Ingold 1993; Tilley 1994); (8) anthropogenic, or human made, the antithesis of the wilderness so beloved by conservationists (Erickson 2000; Redman 1999; Stahl 1996); (9) intensively used and densely inhabited by native and other peoples (Denevan 2001; Erickson 1996; Netting 1993); (10) associated with poor, rural peoples who are lacking in political power (Denevan 2001; Netting 1993); and (11) structured by local, non-Western principles of design and hence underappreciated by non-natives.

Many intensively farmed agricultural landscapes in the Andean region of South America are highly patterned and formally designed (Fig. 2). I refer to these landscapes as anthropogenic and consider them a form of built environment (Erickson 2000). These built environments are equal in complexity and design to any traditionally recognized building architecture or monuments. Most are truly engineered, with landscape capital and the accumulated infrastructure of fields, walls, paths, roads, canals, and other land improvements, the knowledge of which is passed down from parents to children over many generations (Erickson 2000; Lansing 1991:12). Many traditional agricultural landscapes support large rural populations and have been farmed sustainably for thousands of years.<sup>2</sup>

The built engineered environment, or landscape capital, of individual rural farming communities is often more monumental than the works created by centralized nonindustrial states. Computer modeling of the farmed landscapes of single ethnographic and archaeological communities in the Lake Titicaca basin of Peru and Bolivia provides volumetric calculations of construction fill for terrace platforms and the lengths of facing walls. The volume of soil moved and linear walls constructed within the spatial footprint of single communities dwarfs that of monumental sites. These studies show that the total energy expended in earth movement alone by single farming communities is up to two hundred

*Figure 2*

Aerial photograph of the complex formal patterning of pre-Columbian raised fields at the edge of Lake Titicaca, Peru. Old canals (dark lines) between the raised field platforms (light lines) are clearly visible. Photo by Clark L. Erickson.



times greater than that which was expended at individual monuments at ceremonial and administrative sites (Erickson n.d.).

Landscapes also have “cultural capital” or “social capital” (see Throsby and Low, this volume). Agricultural landscapes are the product of many generations of farmers applying their indigenous knowledge and technology to what are often considered marginal lands. The lifeways of present and past peoples are embedded in landscape: their settlements, technology, land tenure, social organization, and worldview have material expression in the physical patterning and palimpsest of landscape features (field morphology, house compounds, walls, networks of paths and roads, field boundary markers, and rural shrines). Through the reading of landscapes, archaeologists glean insights about “the people without history,” those who are ignored by traditional archaeological research and historical analysis (Wolf 1982). The archaeology of landscapes is about *peopling* the landscapes of the past and present (Erickson 2000; Ingold 1993; Tilley 1994).

What is the real economic and cultural value of “relict,” “continuing,” or “lived in” agricultural landscapes? I argue that agricultural landscapes have significant tangible and intangible values for local peoples, the nonlocal public(s), national governments, and the international community (see Fairclough, Siravo, Noriega, and Haney, this volume). But value means nothing without advocates. In contrast to other categories of cultural landscapes, agricultural landscapes have few advocates in the world heritage and cultural resource management communities. Archaeologists should be the primary advocates of traditional agricultural landscapes, but, unfortunately, traditional archaeology is still firmly committed to the “site concept” (Dunnell 1992; Fotiadis 1992). Archaeologists find, excavate, analyze, interpret, and protect sites, which tend to be large urban settlements with significant buildings and monuments of stone and brick. Landscape, often equated with environment, is simply considered the context or background for sites and monuments. Surprisingly, the most vocal advocates of agricultural landscapes are cultural geographers (of the Berkeley school founded by Carl Sauer, e.g., Denevan 2001; Zimmerer 1996), cultural anthropologists interested in indigenous knowledge systems (e.g., Brokensha, Warren, and Werner 1980; Lansing 1991; Netting 1993; Warren, Slikkerveer, and Brokensha 1995), local travel agents involved in eco- and cultural tourism, native peoples and local residents, and private landowners.

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### The Problem of Traditional Definitions of Cultural Landscape

In 1992 UNESCO included cultural landscapes in its *Operational Guidelines for the Implementation of the World Heritage Convention*. While this is a positive step, monuments, groups of buildings, and sites continue to dominate the registry. As of 1998 UNESCO included 522 properties as World Heritage Sites (418 cultural properties, 114 natural properties, and 20 considered mixed cultural and natural sites) (Cleere 2000:99). Of these, only 14 are cultural landscapes, most of which were already registered because of their association with important buildings, monuments, or natural features rather than their intrinsic value (Cleere 2000:9, 102).<sup>3</sup> Agricultural

landscapes remain the most underrepresented category of World Heritage. According to UNESCO,

*Cultural landscapes* represent the “combined works of nature and of man” designated in Article 1 of the Convention. They are illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal. They should be selected on the basis both of their outstanding universal value and of their representativity [*sic*] in terms of a clearly defined geo-cultural region and also for their capacity to illustrate the essential and distinct cultural elements of such regions. (2002:9)

The *Operational Guidelines* (UNESCO 2002:9) state, “The term ‘cultural landscape’ embraces a diversity of manifestations of the interaction between humankind and its natural environment.” The document recognizes three main categories of cultural landscapes:

- (i) The most easily identifiable is the clearly defined landscape designed and created intentionally by man. This embraces garden and parkland landscapes constructed for aesthetic reasons which are often (but not always) associated with religious or other monumental buildings and ensembles.
- (ii) The second category is the organically evolved landscape. This results from an initial social, economic, administrative, and/or religious imperative and has developed its present form by association with and in response to its natural environment. Such landscapes reflect that process of evolution in their form and component features. They fall into two subcategories:
  - a relict (or fossil) landscape is one in which an evolutionary process came to an end at some time in the past, either abruptly or over a period. Its significant distinguishing features are, however, still visible in material form.
  - a continuing landscape is one which retains an active social role in contemporary society closely associated with the traditional way of life and in which the evolutionary process is still in progress. At the same time it exhibits significant material evidence of its evolution over time.
- (iii) The final category is the associative cultural landscape. The inclusion of such landscapes on the World Heritage List is justifiable by virtue of the powerful religious, artistic, or cultural associations of the natural element rather than material cultural evidence, which may be insignificant or even absent. (UNESCO 2002:9)

The site concept permeates the definitions and categories of cultural landscapes. I believe that the unique nature of cultural landscapes is not easily subsumed under the epistemology of the site concept that

dominates archaeology and World Heritage management. Association with a sacred natural feature (i.e., a place) recognized as religiously important characterizes “associative landscapes” protected as World Heritage, not the landscape itself. As Church (1997:26) points out, “Landscapes are not merely large areas, nor are they aggregates of sites as most regional archaeological studies are structured.”

Traditional agricultural landscapes of the Andean region, as a subcategory of cultural landscape, seem to fall between the cracks of contemporary definitions provided by UNESCO. Agricultural landscapes, although not specifically mentioned, would be considered “organically evolved landscapes.”<sup>4</sup> UNESCO (2002:9) attributes this category to “an initial social, economic, administrative, and/or religious imperative” that organically evolves “by association with and in response to its natural environment.” The statement seems to imply that (1) top-down demands were made on people occupying the land and (2) the landscape develops through an evolutionary process of interaction between culture and nature. The formation of landscape is attributed to the unintentional result or by-product of human occupation and use of the land over long periods. As such, there is little room in this definition for human agency, decision making, and historical contingency. According to UNESCO’s categorization, in the Andes, abandoned archaeological terraces and raised fields would be classified as relict landscapes; and currently farmed terraced fields would be classified as continuing landscape. In this case study, I argue that the distinction between “relict” and “continuing” is artificial, because all cultural landscapes exist in the present and are part of the living, inhabited contemporary world.

The organically evolved landscape is contrasted to the categories “clearly defined landscape” and “associative cultural landscape.” Clearly defined landscapes specifically include formal gardens and parks. As ideal forms of the Western cultural landscape, gardens and parks embody formal design, monumentality, and elite aesthetics, which are often contrasted with vernacular, unstructured, farmed landscapes or rural countryside. The clearly defined landscape again highlights the influence of the site concept in UNESCO’s definitions of cultural landscape. These landscapes “are often (but not always) associated with religious or other monumental buildings and ensembles” and thus should be valued because traditional buildings, monuments, or sites are found on them. Why can’t cultural landscapes be appreciated as cultural landscapes?

UNESCO’s perception of cultural landscapes as “manifestations of the interaction between humankind and its natural environment” implies an association with nature. Agricultural landscapes are much more than simply the product of interaction between nature and culture. UNESCO’s categories reify the artificial distinction between natural and cultural landscapes. As a consequence, the pervasive myth of the pristine environment and the concept of wilderness continue to shape World Heritage policy. Recent edited volumes promoting cultural landscapes as World Heritage (Lucas 1992; von Droste, Plachter, and Rossler 1995) reproduce the perception that human activities are bad for the environment.<sup>5</sup> This literature ignores the important insights of New Ecology that stress that chaos, disturbance, patches, and change are necessary for environmental health (e.g., Botkin

1990). Historical ecologists point out that no landscape of the Americas is natural or pristine (e.g., Denevan 1992; Stahl 1996). All landscapes are anthropogenic to some degree. Land recognized as natural or wilderness is the product of thousands of years of native agroforestry, farming, herding, burning, and other cultural activities. Landscapes that have been “domesticated” to some degree by past and present farmers or hunter-gatherers are now the ubiquitous landform on earth.

The association with nature is most evident in the third category of cultural landscape, “associative cultural landscape.” Here, significance is linked to “powerful religious, artistic, or cultural associations with the natural element rather than material cultural evidence” (UNESCO 2002:10; see also Carmichael et al. 1994). The category is clearly intended to protect significant natural features and the immediate viewshed around them. The associative cultural landscape is reduced to a backdrop or natural setting for a place or site. As Bradley (2000) points out, landscapes with natural places of religious significance are “marked” by subtle archaeological features and activities (shrines, alignments, orientations, and caches of offerings) that are important cultural resources themselves.

Andean landscapes are much more than simply the interaction between humans and nature. Their significance is independent of traditional monumental architecture, buildings, or sites. These agricultural landscapes have been transformed to the extent that they are completely anthropogenic and have become built environment. As this case study shows, Andean agricultural landscapes are highly patterned and intentionally designed according to practical, aesthetic, and cosmological principles; thus, they should be classified as “clearly defined landscapes” (although not necessarily “clearly defined” in terms of cultural or physical boundaries).

In Latin America, cultural landscapes are not currently protected as a distinct category of cultural heritage but rather through association with high-profile “natural” or “pristine” environments of high biodiversity (examples include the World Heritage “mixed natural and cultural sites” of Machu Picchu Archaeological National Park and the Rio Abiseo National Park). The concept of wilderness still dominates cultural and natural resource management in developing countries. In developing countries in Latin America where the concept of cultural landscape is poorly developed, the “coattailing” or “piggybacking” of agricultural landscape protection to national parks, nature reserves, indigenous territories, traditional sites, and monuments is one approach. The problem is that the anthropogenic characteristics of traditional agricultural landscapes are at odds with green politics and environmentalism, which prioritize protection of a pristine nature or wilderness.

I believe that many traditional agricultural landscapes are of sufficient significance to be considered World Heritage Sites. Below I make a case for present raised field agriculture.

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## Rehabilitation of Raised Field Agriculture in the Lake Titicaca Basin

The Lake Titicaca basin in the south central Andes of present-day Peru and Bolivia is one of the most impressive engineered landscapes in the world (Erickson 2000). Much of the pre-Columbian agricultural infrastructure is still in use, although poorly maintained. Abandoned raised fields, sunken gardens, and various hydraulic earthworks are found throughout lake and river





Figure 3  
The distribution of pre-Columbian raised fields in the Lake Titicaca basin of Peru and Bolivia (after Denevan 2001:Fig. 13.1)

plains. The mountainous slopes are covered with stone-lined terraces, boundary walls, and canals. In the early 1980s I began a study of one abandoned farming system, raised field agriculture. The goal of the investigation was to describe; map; date origins, use, and abandonment; and determine the functions, carrying capacity, and sustainability of raised field agriculture. Raised fields (Spanish: *camellones*; Quechua: *waru waru*; Aymara: *suka kollus*) are elevated planting platforms of earth (1 to 20 meters wide, 10 to hundreds of meters long, and 0.5 to 1 meter high). Adjacent to each platform are canals that provided the earth for construction. My Peruvian colleagues and I estimate that raised fields cover more than 120,000 hectares of the Lake Titicaca basin, most of which now lie abandoned (Fig. 3). Archaeological excavations of raised fields demonstrated that farmers began constructing them by 1000 B.C. The production from raised fields and other intensive forms of agriculture underwrote the complex societies that developed within the basin.

Raised field agriculture was abandoned before or soon after the Spanish conquest, and most of the fields were converted into pasture for colonial haciendas and became government cooperatives in 1968. We found that rebuilding and using the fields was the best way to understand raised field agriculture (Fig. 4, Color Plate 13). From the beginning, local

Figure 4  
Construction of experimental raised fields during the dry season by farmers of Huatta, Peru, 1986. Photo provided by Instituto Geográfico Militar.  
(See also Color Plate 13.)



farmers were active participants in this experimental research. Through archaeological investigation and agronomic experimentation, we determined that raised fields resolved many of the problems facing farmers at high altitude (Fig. 5). Through raising the platform, farmers doubled the depth of topsoil for crops. The elevated platforms created dry surfaces in the waterlogged and flooded lake and river plains. The water-filled canals beside the platforms provided moisture for droughts during the growing season. Heated by the sun during the day, the water in canals protected crops against the killing frost that is common at high altitude. In addition, the canals captured nutrients and produced organic-rich sediments that could be incorporated into the fields for sustained harvests. During the first few years after reconstruction, the experimental raised fields produced harvests two to three times that of nonraised fields (Fig. 6).

Based on the success of the experiments, between 1981 and 1987, my Peruvian colleagues and I began a small-scale, grassroots development project to rehabilitate pre-Columbian raised field agriculture in several native communities (Erickson 1996; Erickson and Candler 1989). By working with larger groups of farmers, we could expand the scale of the agronomic experiments and reach the people who could benefit from the knowledge (Fig. 7). Agronomists and development agents working in the Lake Titicaca basin, initially resistant to raised field rehabilitation, began to support the technology. By the late 1980s many nongovernmental organizations (NGOs) and government agencies in Peru and Bolivia were promoting raised field rehabilitation (e.g., Kolata et al. 1996; PIWA 1994).

*Figure 5*  
Andean crops (potatoes, ocas, ullucus, isañucus, quinoa, and cañihua) growing on rehabilitated raised fields at Illpa, Peru, 1986. Photo by Clark L. Erickson.

*Figure 6*  
Harvest of potatoes grown on rehabilitated raised fields in Huatta, Peru, 1985. Photo by Clark L. Erickson.



*Figure 7*  
Quechua farmers reviewing interviews for a raised field training video, 1985. Photo by Clark L. Erickson.

According to some estimates, farmers of several hundred Quechua and Aymara communities rehabilitated between 500 and 1,500 hectares of raised fields by 1990. Our textbooks, extension manuals, and training video on raised field and terrace rehabilitation were widely circulated with the larger corpus of NGO-produced materials on traditional agriculture, appropriate technology, and sustainable development (Fig. 8). After more than twenty years of investigation and promotion, *waru waru* and *suka kollus* are now integrated into public school curricula throughout Peru and Bolivia. The attention also inspired investigations of and a greater appreciation for other indigenous technologies and crops.

NGO and government personnel endorsed raised fields as home-grown sustainable development. The national and international press over-promoted raised fields as the solution to rural poverty in the Andes and elsewhere. By the 1990s criticism of raised field projects and reports of the

Figure 8  
A selection of comic books and manuals about raised fields developed for public outreach, extension, and training. a-b: Proyecto Agrícola de los Campos Elevados; c: Programa Interinstitucional de Waru Waru, NADE/ PELT-COTESU.



abandonment of recently rehabilitated fields began to appear and the sustainability and appropriateness of raised fields and other traditional Andean farming systems was questioned. I am convinced that if certain policies and strategies are promoted, raised field technology is sound and sustainable. The experiments demonstrated that raised fields have relatively high productivity and are probably capable of sustained yields under good management. Farmers that have continued to maintain rehabilitated raised fields in Peru and Bolivia are encouraging indications of success.<sup>6</sup> The archaeological record shows that raised fields sustained huge populations, provided the basis for complex sociopolitical institutions, and were used for more than two thousand years; thus raised fields are an indigenous, time-tested, environmentally appropriate technology. Detailed cost-benefit analyses show that raised fields are economically sound (PIWA 1994).

Technological and economic appropriateness does not necessarily mean that contemporary farmers of the region will or should adopt raised field agriculture. Surprisingly, some reasons for adoption of raised fields by farmers had little to do with appropriate technology and high productivity. During the 1980s, Huatta, Coata, and surrounding communities petitioned the Peruvian government for lands held by the government cooperative SAIS Buenavista. Pre-Columbian raised fields cover these lands, which originally belonged to these communities. When the government resisted the petitions, farmers occupied the lands, beginning a tense standoff between communities and police. The government finally ceded the lands to the communities in the late 1980s. Almost immediately, blocks of raised fields were built to mark the new boundaries between neighboring communities. Rehabilitated raised fields became a powerful political marker of a community's right to occupy and farm traditional lands (Erickson and Brinkmeier 1991).

Many farmers participated in order to receive incentives (food, wages, seed, and/or tools) provided by the agencies promoting the rehabilitation of raised fields. As we will see below, the use of incentives can have a negative effect on continued cultivation of rehabilitated raised fields and contribute to field abandonment. Some cases of spontaneous adoption (without incentives) by curious individual farmers are documented (Erickson and Brinkmeier 1991; Pari, Aguilar, and Cutipa 1989:35–36; PIWA 1994:52).

The social and cultural side of raised field agriculture is understood less than the technology. While most Quechua and Aymara farmers immediately recognize the benefits of raised field agriculture, the majority have not permanently adopted it as a production strategy. During a brief evaluation of raised field rehabilitation projects in 1989, we found that the reasons for nonadoption are complex and fascinating (Erickson and Brinkmeier 1991; Garaycochea 1988; Pari, Aguilar, and Cutipa 1989; PIWA 1994:169).<sup>7</sup> The most important factor is that the social, political, and economic environment today is different from that when the raised fields were first constructed and used. Other important factors are competing labor demands, traditional fallow cycles, crop genetic loss, competition with livestock, land tenure issues, limited NGO knowledge of the technology, misuse of incentives, political unrest, and emphasis on communal farming rather than the individual farmer.

*Competing labor demands.* The initial construction of large blocks of raised fields requires considerable labor (although total labor is relatively low when spread out over many years of continuous cultivation). By necessity, many farmers participate in migratory labor for temporary wage income in the cities and mines for part of the year, drawing labor away from the farm. In addition, competition between NGOs and government agencies for projects in well-organized communities has been intense. Farmers often have had to choose between projects offering substantial incentives.

*Traditional fallow cycles.* Farmers traditionally practice a three-year cropping period followed by a fallow (leaving fields uncultivated) period of up to twenty years. This cycling is an effective, low-cost means of cultivating the exhausted and eroded soils of the hill slopes where most farming is done. Although raised field agriculture under good management may not require long fallow cycles, farmers today apply the traditional cycle used for slope cultivation to rehabilitated raised fields. Many of the rehabilitated raised fields that appear recently “abandoned” may actually be in fallow.

*Crop genetic loss.* The specific crops adapted to the unique conditions of the cold lakeshore where pre-Columbian raised fields are found were lost with the abandonment of the field systems following massive depopulation of the region during the early colonial period. The crops grown on rehabilitated raised fields today are adapted to a radically different environmental zone: higher altitude slopes. The original crops probably produced consistent and higher yields than those now cultivated on rehabilitated raised fields.

*Land tenure issues.* Issues of land tenure are often central to farmers’ decisions about whether to adopt raised fields. Most pre-Columbian raised fields are found on hacienda and government cooperative lands—lands that until recently were not controlled by indigenous communities in Peru. Since the colonial period, these lands were used exclusively for grazing sheep and cattle. Many communities in Peru maintain communal land for building raised fields; in contrast, few communities in Bolivia have communal landholdings. Thus in Bolivia, many rehabilitated raised fields built by communities were located on private lands “loaned” to them for an unspecified period. When the landowners realized the potential of the raised fields, permission to farm the land was withdrawn. Lacking sufficient labor to continue, the owners soon stopped cultivating the raised fields (Kolata et al. 1996; Kozloff 1994).

*Competition with livestock.* The raising of livestock is now an important source of income for Quechua farm families. Farmers who control areas of raised fields must often choose between rehabilitating raised fields and grazing livestock. Because of the relative higher market value of animals, farmers have chosen livestock over raised fields. Efforts to integrate livestock and crop production in raised fields have not yet been successful.

*Limited NGO knowledge of the technology.* In the beginning, it was difficult to convince local NGOs and government agencies of the importance of indigenous technology in development. After initial resistance to raised fields, in the late 1980s agencies began to support raised field

rehabilitation. While many groups enthusiastically promoted raised field technology, their understanding of the technology was often limited. Their emphasis on making raised fields “look good” often required extra labor. Field platforms were often built higher than necessary, doubling the number of person-days of labor. Rather than simply rehabilitate preexisting raised fields, some NGOs promoted construction of new fields, again adding unnecessary labor. New fields were often built in inappropriate locations and constructed at the wrong time of the year, thus destroying old raised fields, inverting fertile topsoil with subsoil, and disrupting drainage. Crops inappropriate for local conditions were often imposed on the communities, resulting in harvest failures (Erickson and Brinkmeier 1991; Pari, Aguilar, and Cutipa 1989; PIWA 1994). In addition, those who promoted raised field agriculture promised results that were unrealistic and provided misleading information about harvests, sustainable yields, and risks.

*Misuse of incentives.* Most development groups rely heavily on the distribution of surplus food provided by the USAID PL480 program as an incentive. During the mid-1980s, the government of Peru promoted raised fields as “make-work projects” in which farmers were paid low daily wages to rehabilitate fields. The payment of incentives (wages, food, tools, and seed) to participants became the accepted means of increasing farmer participation in projects throughout Peru and Bolivia, often creating bidding wars among development agencies (Garaycochea 1988). This patronizing top-down approach is in sharp contrast to the grassroots approach of our original project. Rather than see the projects as rural community development, farmers felt they were “working for” the host development agency or NGO. After rehabilitating raised fields on their own lands, farmers often demanded additional wages to plant, harvest, and maintain them. These raised fields were soon abandoned when the NGOs refused to pay the additional wages and moved on to new projects. In other cases, agencies used a rotating fund of loaned potato seed whereby communities had to return the seed and 10 percent interest after harvest (some groups demanded half of the harvest).

*Political unrest.* Because of the war between the Peruvian government and the Shining Path during the late 1980s and early 1990s, most international aid agencies promoting raised fields left Peru. As a result, NGO funding for promoting raised field rehabilitation ended, projects were dissolved, and fields were abandoned. The political unrest, combined with the short duration of individual projects and the ever-changing missions of NGOs and funding agencies in good times, ended the golden age of raised field rehabilitation.

*Emphasis on communal farming rather than the individual farmer.* We found that most of the rehabilitated raised fields that were abandoned by the 1990s were those constructed by communities or large groups of farmers working together (Erickson and Brinkmeier 1991). Our project and most of the NGOs and government groups working in the region focused on communities rather than individual farmers. We believed that raised field rehabilitation would help to reinforce community development. We also found working with large community groups for the construction

of large blocks of raised fields much more efficient than working with individuals. Poor organization and leadership, internal tensions, and land tenure problems within communities worked against long-term sustained commitment to communal farming of large raised field plots (Erickson and Brinkmeier 1991; Kehoe 1996; Kolata et al. 1996; Kozloff 1994; Pari, Aguilar, and Cutipa 1989).

In contrast, raised fields constructed by individual families, often without support and incentives from NGOs and other groups, continued in use and actually flourished through the 1980s and 1990s. These small blocks of fields were often intensively farmed as house gardens (Fig. 9). The family raised fields were well built and maintained for longer periods. The success of the “multiplier effect,” the adoption and promotion by individual families, is difficult to track but remains an important means of diffusion and adoption of raised field technology.

In summary, the issue of sustainability of raised fields is complex and not simply one of technology, soil fertility, or labor requirements. There are no studies of continuous production on the experimental raised fields of Lake Titicaca because of the short life of development projects and the lack of long-term follow-up; thus sustainability has not been demonstrated. The archaeological record provides an important source of data on sustainability. Documented use of pre-Columbian raised fields for 2,000 to 2,500 years suggests that the technology was efficient, appropriate, productive, and sustainable. Settlement archaeology also shows that rural communities were rooted to particular geographic places for thousands of years (despite the periodic rise and fall of state societies in the region).

The experimental rehabilitated fields, as well as the pre-Columbian fields, were constructed for specific reasons and in specific historical contexts. Why they worked or did not is a complex matter and has more to do with social, cultural, and economic factors than with labor or technology issues. The factors outlined above are interrelated, and all work against the adoption of raised field agriculture by contemporary farmers.

*Figure 9*

A rehabilitated raised field built by an individual family in Huatta, Peru. Photo by Clark L. Erickson.



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## The Intangible Cultural Value of Traditional Agricultural Landscapes

Do raised fields have relevance to contemporary society beyond simply being used? Is the adoption and use of raised field agriculture by contemporary farmers a prerequisite for classification as having “outstanding universal value” and thus deserving of protection as World Heritage? Although current “living” use would better ensure survival, these agricultural landscapes may be valuable for other reasons.

To be nominated for World Heritage protection, UNESCO requires that a cultural landscape be of “outstanding universal value.” As Cleere (1995, 1996) points out, this concept is problematic in theory and in practice. Cultural landscapes are less likely than traditional sites and monuments to meet the criteria of outstanding universal value and be considered for nomination. Cleere (1995:229) argues that appreciation of cultural property is not universal or homogeneous and that decisions are often based on “an aesthetic and historical perspective that is grounded in European culture.” Responding to Cleere’s critique, Titchen (1996) notes that the concept “outstanding universal value” is purposely vague and under continual construction.

Government planners, development agency personnel, and tourists look out over the rural Andes and see endless grinding poverty, backwardness, and ignorance. Anthropologists, archaeologists, and geographers see an idyllic, beautiful landscape filled with happy peasants employing a rich indigenous knowledge and sophisticated technology. Do traditional agricultural landscapes such as raised fields have outstanding universal value and thus merit protection as World Heritage Sites? Some important reasons for advocating, protecting, and managing traditional agricultural landscapes are these:

- Traditional agricultural landscapes harbor a rich gene pool of domestic, semidomestic, and wild species of landraces, an important resource that can be mined for new cultigens, enhanced resistance to diseases and pests, improved storability, and greater variety (recognized by UNESCO [2002:9]).
- Environmentalists, conservationists, and social and natural scientists are coming to recognize that the anthropogenic landscape will play an increasingly important role in the future of the environment of our planet. Scholars are beginning to understand that wilderness is a cultural construct and that all environments are to some degree anthropogenic.
- Agricultural landscapes are dynamic contexts for the expression of local, regional, and national cultures. The cultural diversity of living peoples within landscapes is often considered analogous to biological diversity. Cultural survival often depends on a strong sense of place, belonging, and identity rooted in local history and prehistory and embedded in the landscape, which connects past, present, and future.
- Agricultural landscapes, characterized by a complex stratified palimpsest of patterned human activity through time, are physical records of agriculture, risk management strategies, building technology, environmental change, and historical ecology. In



many cases, the archaeological record of human activity on the landscape is all that remains of past occupants.

- Agricultural landscapes provide local, time-tested models of appropriate technology and sustainable land use (recognized by UNESCO [2002:9] and the International Union for the Conservation of Nature, or IUCN [McNeeley 1995]). Archaeological and historical research can document resilience, long-term continuous use, high carrying capacities, and environmentally friendly practices.
- Cultural landscapes are both a model of and a model for society and thus play an important role in the transmission and reproduction of local culture. Local, national, and international appreciation of traditional agricultural landscapes reinforces native cultures.
- International appreciation and recognition of the cultural heritage and indigenous knowledge systems embedded in agricultural landscapes can empower native peoples in their efforts to gain political representation, promote economic development, reinforce local cultural identity, and win land disputes.
- The environmental, cultural, historical, and archaeological significance of agricultural landscapes for national and international tourism can be a source of income for local people. Native people benefit from increasing cultural tourism that focuses on the “lived in” agricultural landscapes of Bali, Cuzco (Peru), and the islands of the Sun, Taquile, and Amantaní (Bolivia and Peru), and the Ifugao (Philippines).

Some “values” of agricultural landscapes such as crop production and sustainability are measurable and quantifiable. Experiments and field trials of traditional agriculture provide critical information about function, ecological appropriateness, production rates, cropping frequency, carrying capacity, and sustainability. Cost-benefit analysis provides standards for comparing Andean traditional agriculture to Western and other non-Western agricultural systems (PIWA 1994). Issues of sustainability and appropriateness can be addressed through scientific study (Denevan 2001; Erickson 1996; Morlon 1996). In the case of raised fields, applied research of the 1970s and 1980s provided important scientific validation (experiments, cost-benefit analysis; production rates, management of resources, and social issues of adoption and rejection). This research by university students, professionals, and native peoples was presented and published in a variety of scholarly and public forums. Although the body of literature on raised fields and other Andean technologies is small compared to that available for Western agricultural systems, it demonstrates that raised field agriculture has potential as a sustainable technology under certain conditions and contexts.<sup>8</sup>

Many authors in this volume highlight the importance of cultural capital in considerations of determining the “value” and sustainability of World Heritage. Can monetary value be assigned to the natural, ecological, aesthetic, historical, archaeological, religious, and cultural significance of

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## The Interface between Sustainable Development and World Heritage

an agricultural landscape discussed above? Studies of the economy of the environment and the economy of art (Throsby, this volume) show promise.

The abandonment of valuable farmland, rural to urban migration, increasing rural poverty, and the replacement of family farms by large commercial operations are significant problems throughout the developed and developing world. The causes and solutions for these phenomena are complex. Keeping people on the farm with an acceptable standard of living and putting abandoned farms back into production through sustainable development should be a major priority.

The attitudes of government and nongovernmental organizations financed by the World Bank, the International Development Bank, USAID, UNESCO, and others toward traditional agriculture often contribute to the problems. These organizations should reevaluate their current policies of imposing top-down, Western-based models of development on non-Western farmers (see also Cleere 2000:104–5). The arrogant “received wisdom” that drives contemporary development policy is often based on poor science and lack of understanding of local cultures, political economy, and historical ecology (Leach and Mearns 1996; Peet and Watts 1996). There is a long tradition in the development community of blaming environmental degradation and poverty on rural farmers. During my research in Peru and Bolivia, numerous international development projects were designed to replace “backward” traditional agriculture with Western “appropriate technology.” Most projects ended in complete failure (although they were rarely officially recognized as such). The Lake Titicaca basin is a graveyard of development, a landscape littered with cracked cement-lined irrigation canals, rusted pumps, twisted windmills, and broken farm machinery, or what my colleagues Ignacio Garaycochea and Juan Palao refer to as the “archaeology of development” (Fig. 10, Color Plate 14). Development

*Figure 10*

The archaeology of development, 1986. The physical relicts of failed international development projects promoting capitalist-based and “appropriate technology” during the 1960s, 1970s, and 1980s at the Illpa Agricultural Experimental Station, Puno, Peru. Photo by Clark L. Erickson.

(See also Color Plate 14.)



projects are introduced and fail with regularity, while Andean farmers continue to rely on the tried-and-true traditional agriculture practiced by their ancestors complemented by selective innovations. Advocacy for agricultural landscapes also requires setting the record straight about the pros and cons of native technology and practices (Dupuis and Vandergeest 1996).

I am convinced that traditional agricultural technology, indigenous knowledge, and rural lifeways, past and present, provide alternative models for development of cultural landscapes if certain strategies and policies are promoted. These might include

- acquiring formal land titles for individual farmers and native communities. As Netting (1993) argues in his cross-cultural study of smallholders, private family ownership of land plots being farmed has been and is the basis of sustainable agriculture throughout the world. The best way to keep farmers on the land and reduce the massive migration to urban centers is to ensure legal titles to the land they work and provide land to those without. Ownership of plots encourages continuity of occupation, reduces risks, and encourages improvements of the land (McNeeley 1995; PIWA 1994).
- improving access to economic resources. Most farmers would benefit from access to credit and tax incentives for family land improvements and risk reduction, opening of markets for traditional crops produced on these lands, and training in cooperative organization and small business administration.
- guaranteeing social justice or an acceptable quality of life for farming peoples in developing countries. These are important but often neglected elements of the original definition of sustainable development (CIKARD 1993). Reduction of the exploitation, violence, and racism against native peoples would help to ensure the survival of traditional agricultural landscapes.
- understanding and valuing strategies of risk management practiced by native farmers that enable them to adapt their traditional agriculture to the global economy. In countering the common stereotype of traditional agriculture as primitive, backward, stagnant, and inefficient, scholars have demonstrated that many farmers are constantly adapting, transforming, and adjusting their traditional strategies to meet new demands and challenges (Denevan 2001; Morlon 1996; Netting 1993; Zimmerer 1996).

Certain resources and policies that are already in place in the development community could be shifted to encourage, promote, and improve what already works or was known to work in the past: local indigenous knowledge and farming practices. To reduce bias against traditional agricultural practices, local historical ecology, indigenous knowledge systems, agricultural ecology, archaeology, history, ethnography, and local language should be part of the standard training for extension agents and development workers. Governments and international funding agencies routinely require environmental and cultural impact studies for large

development projects (pipelines, roads, urbanization, irrigation, and dams). These mitigation studies, in addition to the traditional focus on historical and archaeological sites, monuments and wilderness, could become a primary source of new information about traditional agricultural landscapes and indigenous knowledge systems.

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## Value and Advocacy of Traditional Agricultural Landscapes as World Heritage

Throughout his life, the anthropologist Michael Warren promoted scientific research as the best way to validate and promote indigenous knowledge systems (IKS) (Brokensha, Warren, and Werner 1980; Warren 1999). To promote scientific and global appreciation of IKS, Warren advocated its incorporation into school programs, university education, and development training, in addition to promotion through traditional media and the Internet.<sup>9</sup>

Natural science critics point out that the advantages of IKS over development based on Western scientific knowledge have not been adequately demonstrated. Others highlight the problems of transferring specific IKS to other contexts. Social scientists argue that proponents of IKS stereotype farmers as static, ahistorical, exotic, and noble savages. Despite the critique, the development community is beginning to recognize that historically contingent IKS can benefit smallholder development (e.g., McNeeley 1995; Pichón, Uquillas, and Frechione 1999; Warren 1999; Warren, Slikkerveer, and Brokensha 1999). In other cases, IKS may contribute little to sustainable development because certain historical and traditional practices may not be relevant or adaptable to the contemporary world. Some indigenous knowledge systems can be combined successfully with Western scientific knowledge (DeWalt 1999). However, traditional practices that have little relevance today may become important in the future.

The traditional agricultural landscape is the cultural context for living, historical, and archaeological indigenous belief systems. They are physically embedded in settlements, fields, walls, canals, paths, and other features of the landscape. The conservation and management of the traditional agricultural landscape is the most effective means of protecting valuable IKS.

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## Conclusion

It will take time to bring the level of recognition of cultural landscapes and the subclass traditional agricultural landscapes to that enjoyed by outstanding natural landscapes, archaeological and historical buildings, sites, and monuments. The United States and Europe have established new institutions and enacted legislation to protect cultural landscapes. Some countries, such as England, include the agricultural landscape under this umbrella of protection and management. Unfortunately, I do not foresee similar developments in Latin America in the near future. Peruvians would never allow a bulldozer on Machu Picchu but think nothing of having one pull a huge plow over pre-Columbian raised fields and terraces in the Lake Titicaca basin (which has occurred in the course of development projects sponsored by the World Bank Project, the National Agrarian University,

and the International Experimental Station Illpa) (Erickson and Candler 1989). UNESCO and other international organizations can influence national and local policies through active recognition and promotion of agricultural landscapes as World Heritage Sites.

Raised fields are physically embedded in the Andean agrarian landscape. The complex patterning, long period of use, high productivity and population carrying capacity, and local historical and ecological appropriateness documented for raised fields and other traditional agricultural strategies on the landscape demonstrate that Andean farming (past and present) is dynamic, resilient, time tested, and sustainable under certain conditions. Because of these characteristics, Andean technologies may provide viable alternative models for development at this critical time of global warming, overpopulation, political instability, and entrenched inequality. Agricultural landscapes have tangible and intangible value for the contemporary world. I would argue that agricultural landscapes such as the raised fields of the Lake Titicaca basin are of "outstanding universal value."

The traditional agrarian landscapes throughout the Andes are threatened, and the indigenous knowledge of the farmers that created them is in danger of being lost forever. After four hundred years of neglect because of rural depopulation, the introduction of Old World crops and animals, and government policies following the Spanish conquest, these landscapes are now under threat from all sides. Poorly planned urbanization encroaches on traditional fields; mechanization of agriculture increasingly erases fragile remains of pre-Columbian fields; the demands of agribusiness, cash cropping, and cultivated pasture are driven by national and international policy, the global economy, unchecked population growth, and the imposition of Western models of development. All have taken their toll on traditional agricultural landscapes.

UNESCO can be a powerful global advocate of traditional agricultural landscapes by helping to reshape development policy that is currently biased against indigenous knowledge systems. UNESCO's present definition and conceptualization of cultural landscapes as World Heritage is inadequate to protect traditional archaeological and lived-in traditional agricultural landscapes. Adherence to the site concept limits serious consideration of traditional agriculture landscapes except where they are incidentally included within the bounds of significant monuments, buildings, sites, or natural areas.

The first step is to ensure that farmers (i.e., smallholders) who are surviving on long-farmed landscapes and using traditional sustainable technology remain there by helping to assure them of an adequate standard of living, land titles, education, access to markets, and freedom from war and violence. In most developing nations, this is a daunting task. It is much easier to maintain an occupied "continuing landscape" than to resuscitate a "relict landscape." UNESCO's formal recognition of these landscapes as World Heritage may provide the catalyst to keep farmers on the land and encourage them to put land back into use when there is evidence that it has been intensively and successfully farmed in the past.

If traditional agricultural landscapes meet the criteria of "outstanding universal value," strict priorities will have to be established. Few

would argue that all traditional agricultural landscapes deserve nomination as World Heritage Sites. Some cultural landscapes are “relict” because they failed for various reasons in the past. Some functioning traditional agricultural systems may have no place in the future. UNESCO and other agencies cannot protect, promote, support, and manage all traditional agricultural landscapes; thus a form of preservation triage is necessary. Traditional agricultural landscapes that were sustainable in the past or are still functioning today should receive priority. Many lived-in “continuing landscapes” exist because they are sustainable and can survive on their own. Farmers in some continuing landscapes are under threat from the outside world and need support. Landscapes with archaeological evidence of sustainable agricultural practices that are presently abandoned or utilized in nonsustainable ways should be studied, evaluated, and, if they meet certain criteria, protected and managed as World Heritage Sites. Priority should be given to unique agricultural landscapes that are in danger of being forever lost and those that show promise for sustaining present and future populations.

“Conservation” and “preservation” are probably the wrong terms to use when discussing a moving target such as a dynamic and complex agricultural landscape (Cook 1996). Any attempt to freeze an agricultural landscape, as a museum object or an heirloom, in some present state or moment in the past will condemn it. The goal should not be conservation or preservation but active management that involves the peoples who inhabit those landscapes. In cases in which the agricultural technology and knowledge have been lost, landscape management must draw on archaeological and historical approaches. The engineered agricultural landscapes of the Andes were produced by human agents, farmers making conscious decisions about the land for their own livelihoods and that of future generations, and represent an accumulation of landscape and cultural capital over considerable periods. The people, past and present, and the science, logic, and aesthetics of their indigenous knowledge systems must be understood and appreciated in order to effectively manage traditional agricultural landscapes. This management will require the active participation of many sectors of society.

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## Notes

- 1 I do not mean to imply static, culture bound, ancient, or exotic in my choice of "traditional." By "traditional," I mean local, shared, historically contingent cultural practices embedded in the land, cultural memory, and practice of everyday life. I use the term "traditional" loosely to refer to categories such as native, peasant, indigenous, smallholder, vernacular, rural, and non-Western that are common in the literature. I recognize that all of these terms are cultural constructs that invariably categorize farmers as "the other" (Dupuis and Vandergeest 1996; Pichón, Uquillas, and Frechione 1999).
- 2 I use the World Commission on Environment and Development's definition of sustainable agriculture as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (cited in CIKARD 1993:3). Although relatively imprecise, "sustainability" connotes the maintenance of high productivity over the long run while managing and protecting local environmental resources from degradation. Sustainable development also promotes an "acceptable livelihood," with connotations of justice and equitability.
- 3 The UNESCO Web site now lists twenty-three properties as cultural landscapes. Close examination of the descriptions of the new properties reveals a continuing bias toward monuments, buildings, and sites on cultural landscapes rather than an appreciation of agricultural landscape. Similar biases can be found in edited volumes on cultural landscapes sponsored by IUCN (Lucas 1992) and UNESCO (von Droste, Plachter, and Rossler 1995). I recognize that UNESCO and IUCN are attempting to become less Euro- and Anglo-American-centric in their consideration of World Heritage (e.g., Cleere 2000; Titchen 1996).
- 4 The Rice Terraces of the Philippine Cordillera and the Agricultural Landscape of Southern Öland, Sweden, are rare examples of cultural landscapes recognized as World Heritage Sites for their agricultural importance.
- 5 A small but growing World Heritage literature recognizes the role of human activity in shaping the environment and the paradigm of New Ecology (e.g., Cook 1996; Thorsell 1995).
- 6 My colleague Ignacio Garaycochea (1988) points out that local NGOs were the primary beneficiaries of raised field rehabilitation. The influx of funding supported a new middle class in Puno, Juliaca, La Paz, that benefited from salaries, importation of four-wheel-drive vehicles, purchases of computers, telephones, and fax machines, and office rental. Local university students received funding for original agronomic research on raised fields. Professional consultants were hired to write proposals, evaluations, and reports. A large number of extension agents, computer experts, educators, videographers, mechanics, secretaries, guards, and other professionals were employed by NGOs during this period.
- 7 Chapin (1988), Kozloff (1994), Kehoe (1996), and Swartley (2000) have also written about the adoption, rejection, and abandonment of rehabilitated raised fields in Mexico and Bolivia.
- 8 The Interinstitutional Program of Waru Waru (PIWA 1994), an NGO promoting raised field agriculture in southern Peru, is an example of sound, applied research and publication. PIWA has conducted social and agronomic research in raised field agriculture, prepared guides for extension agents and farmers, funded student thesis projects, mapped potential zones for raised fields, and published more than fifteen books, in addition to working directly with farmers to rehabilitate traditional agriculture and promote indigenous knowledge.
- 9 The Web is now the best source of information on IKS, some of it written by native peoples themselves.

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