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# TRADITIONAL GARDENING TECHNIQUES AMONG NAHUATL INDIANS: “HUERTOS DE HUMEDAD” IN THE BALSAS RIVER VALLEY, MEXICO

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*Resumen:* Este ensayo documenta una forma de jardinería practicada durante la época de secas por los indígenas hablantes de náhuatl en el estado de Guerrero, México: las llamadas *huertas de humedad*. Estos huertos, construidos sobre los bancos del río Balsas cuando los niveles de agua bajan en la temporada de sequía, fueron reportados por los españoles en el siglo XVI y descritos por Pedro Armillas en la década de 1940. Este sistema agrícola es de especial interés porque representa una continuación contemporánea de técnicas agrícolas prehispánicas. Con base en una investigación etnográfica de largo plazo y documentación fotográfica, este ensayo considera las técnicas constructivas, el ciclo de crecimiento de los cultivos, la organización social de la jardinería y la importancia económica de las huertas, así como las implicaciones ecológicas de esta forma de agricultura.

*Palabras clave:* huertas de humedad, técnicas de agricultura prehispánicas, jardinería, río Balsas, Guerrero.

*Abstract:* This paper documents a form of dry season gardening, *huertas de humedad*, practiced by nahuatl speaking Indians in the state of Guerrero, Mexico. These plots, constructed on the banks of the Balsas River as the water level recedes in the dry season, were reported by Spaniards in the sixteenth century and described by Pedro Armillas in the 1940's. This agricultural system is of special interest because it represents a contemporary continuation of prehispanic farming techniques. Based on long-term ethnographic research and photographic documentation by the author, this paper considers the following features of these gardens: construction techniques, crops grown, social organization of gardening, economic importance of the *huertas*, ecological implications of this form of agriculture.

*Keywords:* huertas de humedad, prehispanic farming techniques, gardening, Balsas river, Guerrero.

Nahuatl speaking Indians in the State of Guerrero practice a laborintensive, highly productive form of gardening in small plots built along the banks of the Balsas River as the water level recedes in the dry season. This agricultural system is of special interest because it was reported by Spanish observers in the sixteenth century and represents a modern expression of prehispanic farming techniques; furthermore it illustrates the diversity and complexity of Mesoamerican agricultural technologies and can shed light on their historical development. Based on long term ethnographic research in the region (Good, 1988; 1993; 1995; 1996; 2001a; 2001b) this article considers construction techniques, labor processes, the social organization of gardening and the crops grown. At the same time describing how contemporary Nahuas create and use the *huertos* gives insight into the role of gardening in social and cultural reproduction, and the symbolic meanings indigenous peoples attach to this activity.

The approach to gardens here draws on two different traditions in scholarly research: Malinowski's pioneering work on Trobriand gardens (1984/1922; 1967/1935) and the cultural ecology approach in anthropology (*c.f.* Steward, 1976; Conklin, 1969; Wolf, 1957; Palerm, 1968; 1972; Murra, 1972) and geography (Troll, 1968; Carl O. Sauer in Leighly, 1963). Research in Mesoamerica and the Andes has tended to focus on the sophisticated technological and ecological features of agricultural systems and the importance of their productive capacity to the development of prehispanic civilizations. The concept of garden is not developed in this literature, perhaps because of its association with Western cultural traditions as eloquently described by Shepard (1991). Malinowski spoke of gardens without offering a definition; his extraordinarily detailed Trobriand ethnography includes technological and ecological aspects of gardening but is much broader. He considers the central role of magicians and magical rites in Trobriand agriculture and provides a wealth of material that could be compared with data from recent research on Mesoamerican agricultural rituals (Albores and Broda, 1997; Broda and Báez-Jorge, 2001; Broda and Good, 2004). Finally, Malinowski emphasized the social significance of work, stored surpluses and the exchange of produce from Trobriand gardens.

### *The Nahuatl Region and Local Ecology*

The Balsas and its tributaries form one of the largest river systems in central and western Mexico. The wide, slow-moving stream where the *huertos de humedad* developed was named Rio Balsas at the time of the Spanish Conquest

because native peoples used rafts to transport goods and passengers on the river through rugged mountainous terrain and to cross its turbulent waters during the rainy season when it swells to three times its dry season volume.<sup>1</sup> An important tributary is the Amacuzac River that flows south from Morelos State until joining the major stream that flows westward across northern and central Guerrero (see figure 1) finally reaching the Pacific Ocean at Lázaro Cardenas, on the border with the state of Michoacan. The Balsas River is crossed by the federal highway to Acapulco at the town of Mezcala, whose name has been given to a style of stone figurines from Guerrero widely distributed in central Mexico. The largest village at the junction of the Amacuzac and Balsas Rivers is Tlacoctitlan; it was the prehispanic capital of the 15th century Mexica tributary province Tlalcozauhtitlan. The area is well-known to archeologists as the location of Teopantecuanitlan, the Olmec site just north of the Balsas and east of the Amacuzac Rivers; this site dating from 1200-800 BC confirms the early presence of relatively dense populations in the region (Martínez Donjuán, 1986).

The gardens described in this paper can be observed all along the Balsas River from above Tlacoctitlan to Mezcala (see figure 1), cultivated by villagers from conservative communities where Nahuatl is spoken by people of all ages, many of them monolingual. This is the only form of irrigated agriculture practiced today. The Nahuatl cultural region is comprised of two distinct subdivisions: the villages around Tlacoctitlan and other dispersed settlements near the junction of the Balsas and Amacuzac Rivers belonging to the municipality of Copalillo, and a larger group of 16 villages further downstream surrounding San Agustin Oapan (see figure 1), the 15<sup>th</sup> century *cabecera* of another political unit that belonged to the Mexica tributary province of Tepecoacuilco (Good, 1988: 207-220).

These villages lie between 500 and 800 meters above sea level along the banks of the Balsas river or in the surrounding hills. The dry tropical forest vegetation that is sparse and brown most of the year becomes profuse and strikingly green in the short intense rainy season from June to September.

<sup>1</sup> This continued through the colonial period and into the twentieth century. I observed makeshift rafts still in use in the 1970's; informants described rafts used from the 1950's and 60's built from dried cactus or wooden planks with bunches of gourds tied underneath to buoy them up. One man from Ameyaltepec obtained timbers for his house from a log-jam floated downstream, frequently done in the 1940's and 50's; the timber was cut above Tlacoctitlan and probably being taken to the highway at Mezcala or the rail line at the now flooded village of Balsas for transport out of the region.

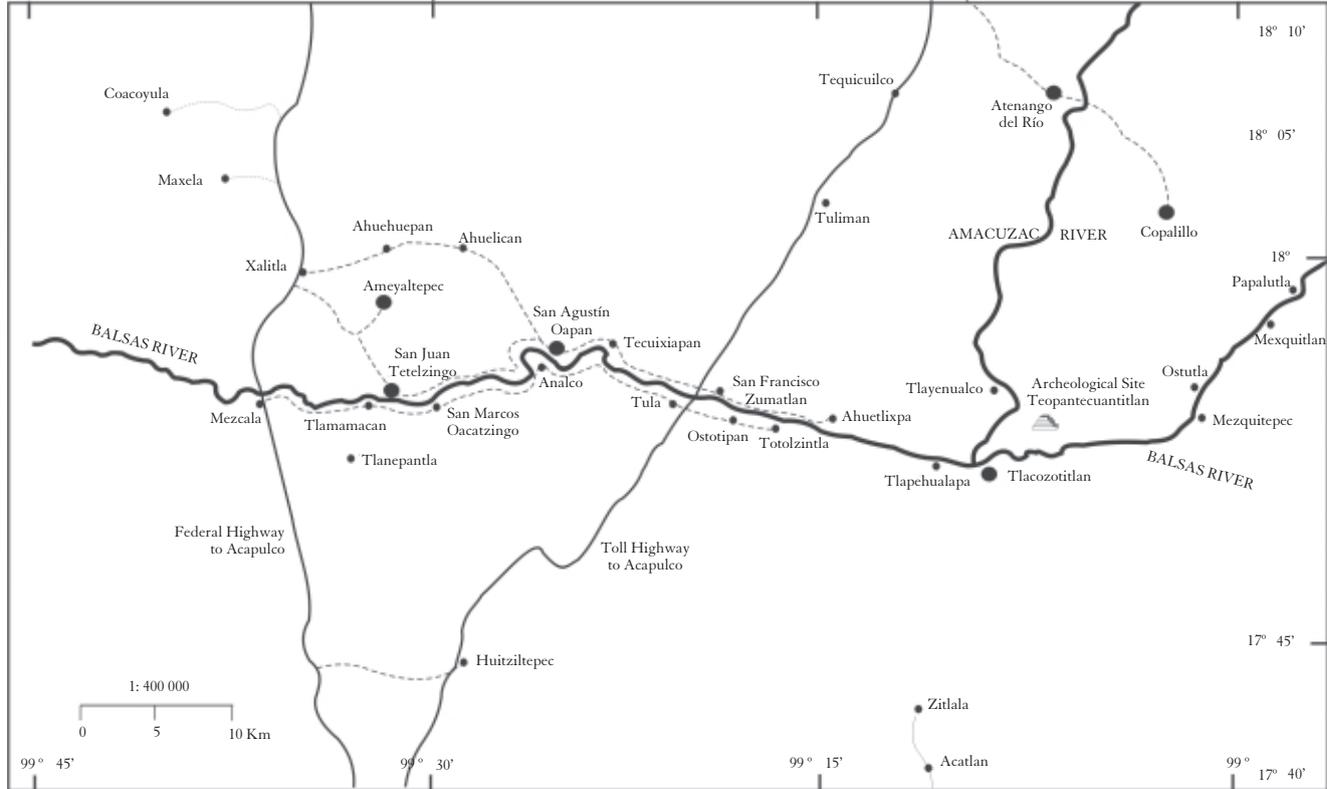


Figure 1. *Pueblos nahuas Balsas*.

This section of the Balsas Valley receives barely enough precipitation to sustain the *milpas*, fields of corn, beans and squash, planted by farmers during the *temporada*. Villagers suffer from unpredictable yields because rainfall is scarce overall and this is coupled with short periods of drought during the summer months that quickly dry out sandy soils. Perhaps for this reason rain, water, agricultural fertility and corn have become the focus of local ritual life. Villagers from the region are well known as artists because they paint scenes of village life and flora and fauna motifs on *amate* bark paper for sale to tourists (Good, 1988; 1996; 2001b) and changing natural landscapes, agriculture and ritual practices are favored themes in their artwork. These ecological conditions should be kept in mind as we evaluate the economic and cultural importance of the gardens.

#### HUERTOS DE HUMEDAD

At the end of the rainy season in early October the Balsas water level gradually begins to fall and the river deposits sediments along wide, sandy sections of the river bed where villagers cultivate their small but productive gardens between December and May until the rains begin again and the river sweeps them away (figure 2). Unseasonable rain caused by winter storms along the Pacific coast or anywhere in the Balsas basin in January or February can occasion a sudden, temporary rise in the river and the risk of flooding is widely recognized by local farmers.

Nahuatl people in the region continue to use agricultural techniques dating from prehispanic times that are described in 16th sources cited by Pedro Armillas (1949) who also noted the existence of these gardens in the first half of the twentieth century. The *Relación de Tlalcozauhtitlan*, part of the *Relaciones Geográficas* published by Barlow (Monjarás Ruiz, 1955) describes them in Oztutla, Papalutla and Mixquitlan near Tlacoztitlan. I encountered the gardens during my own long-term ethnographic fieldwork in the region beginning in 1977, and photographed them in 1984, 1988, 1989 and 1990 in the villages of San Juan Tetelcingo, Analco, San Agustín Oapan, and San Marcos Oacatzingo (see figure 1). Del Amo *et. al.* (1988) provides an excellent description of the ecological principles underlying this agricultural system and Niedeberger (2002: 58) includes a photograph of the *huertos* near Tlacoztitlan. At the time of my fieldwork the plants were irrigated through the natural filtration of moisture up through the sandy soil at the river's edge or hand-watered from



Figure 2. *Exposed sandy river bed in dry season, with filtration gardens in foreground and in distance along existing stream. Water reaches the tree line during the rainy season. Note thorny branches as a fencing material, and dry hills in the background.*

buckets. Informants in San Agustín Oapan told me that small water wheels (*norias*) were used in the 1940's and 50's but I did not observe this. Armillas describes the technique as humidity cultivation (*cultivo de humedad*), Niederberger (2003) calls it humidity horticulture (*horticultura de humedad*) and Del Amo, *et al.* (1988) refers to it as *tecalli* or sandy pit agriculture. I opt for the term *huertos de humedad* (humidity or filtration gardens) because villagers in San Agustín Oapan use the term *huertos* in Spanish to describe them.

#### *Organization of Gardening and Labor Processes*

The decision to build the huertos each year is a collective one and extended family households construct contiguous gardens on different sections of the newly exposed river bed beginning in December after completing the harvest from their milpas during the month of November. Each family builds and maintains its own garden but reciprocal labor is common and groups of families that are often related through kinship or *compadrazgo* ties work adjoining

patches (figure 3). They choose locations where sediments have been deposited –at curves in the river, on flat shores where the water moves slowly and recedes gradually, and at the mouths of dry ravines where small streams empty into the Balsas after summer storms. There is no formal ownership of this land but usufruct rights are respected; families continue to work the same sections of the river bed each year, and apparently there is no shortage of suitable locations.

The gardens consist of flat rectangular beds built in a series of small terraces on the sandy soil. They are extended gradually in step-like fashion down to the waters edge as the river level drops throughout the dry season (figures 4 and 5). Thorny brush is cut and tied to posts to make a barrier around the gardens to keep out pigs, goats, burros and cattle. The gardening implements are simple and readily available to all –shovels, hoes, digging sticks (*coas*), machetes, buckets and gourds. The crucial resources for these gardens are labor, time and the highly specialized knowledge and experience they require. Men, women and children work together, but I observed that women’s labor is essential and the gardens can be successfully cultivated by women



Figure 3. Group of 8-10 adjoining gardens on steep banks where the river curves. Note flat rocks placed for washing in the river, white rags tied to poles as scarecrows.

alone or the elderly, unlike *milpa* agriculture that usually requires male labor for clearing the land and plowing.

In constructing the terraces Nahuas use stones, wooden logs, poles and sticks, dried stalks of sesame plants, coarse grasses or other plant remains to shore them up (figures 4, 6 and 9). The beds nearest the river receive natural moisture that filters up through the sandy soil, while others are hand watered using gourd dishes to dip water from buckets. The gardens can also be made up of a series of parallel, flat beds measuring approximately 1 x 3 meters, sometimes alternating with rows of round, shallow pits<sup>2</sup> (figures 2 and 5). Gardeners cultivate a large variety of plants in a very limited space and mix them within the same beds. They are aware of growth cycles and time planting to ensure that their *huertos* remain in constant production from January through May;



Figure 4. Garden extending to river edge with green branches shoring up a terrace, bed in preparation on right. Plants include cilantro in different stages, onions, epazote, beans, marigolds and greens.

<sup>2</sup> Del Amo *et al.* (1988) use the term *tecalli* for the circular pits, and *macalli* for the rectangular beds, but I did not encounter these names in my own fieldwork; an informant from San Agustín Oapan said *tecalli* is used for both beds and did not recognize *macalli*.



Figure 5. Horizontal beds with amaranth, onions, cilantro, yerbabuena and other greens; round pits with corn, beans, squash, melon and camotes. Note buckets with shoulder yoke for watering.

sometimes they sow seeds in smaller beds and later transplanting sprouts to the terraces.

I found a surprising number of plants used for different purposes being cultivated within these small gardens (figures 2 and 10). Herbs for seasonings are an important component, among them coriander (*cilantro*), *epazote*, onions, and mint (*yerbabuena*); red and green chile are also grown. Vegetables include: two types of aramanth (*cocoquihlli*, *huazontli*); sweet purple, yellow and white varieties of tubers or *camotes* (*camohtli*); leafy greens (*quelites*) including one known locally as *chipillin*; green beans, and another climbing bean known as (*caxtiltzin*); two varieties of squash (*ayutli* and *tamalayutli*), red and green tomatoes. Nahuas also grow fruit and flowers, especially red, yellow and white watermelon, cantaloupe and honeydew melons; sunflowers, marigolds, and deep red *terciopelo* flowers, similar to cockscomb. They plant a few seeds of corn to obtain fresh corn on the cob (*yelotl* or *elote*) and green corn leaves (*izhuatl*) used to wrap tamales for offerings. All the produce from the *huertos* is used to supplement the daily diet of the families that cultivate them, given as gifts or traded to others that do not build these gardens. Part



Figure 6. Mature garden with mixed plants including *cilantro*, *epazote*, *camotes*, *amaranth*, *marigolds*, *chiles*, *squash* and *melons*. Note poles, straw, stones for building terraces, sleeping shelter in upper right corner.

of the yield is sold in the neighboring villages not on the river –Ameyaltepec, Ahuehuepan and Ahuelican– where access to fresh vegetables and herbs improves the dry season diet. Another important use of the produce is in offerings made during agricultural rituals and “fiestas” for the saints, a topic I briefly explore at the end of this article.

Constant and careful manipulation of water, soil and different nutrients ensures maximum fertility. As they prepare the beds for planting, Nahuas add to the sandy soil ash from cooking fires and manure from cattle, burros and mules kept in their houseyards. As the plants begin to grow they bring soil from caves where bat dung (*pahli de tzonacatl*) accumulates and they apply earth mounded around ant hills (*tzicacuitlatl* or *tzontecuitlatl*) gathered in the countryside.<sup>3</sup> The soil from ant hills works as a fertilizer and it also repels

<sup>3</sup>I recently learned that at least until the 1960’s, peasant farmers from the villages of Ojo de Agua and Arroyo Blanco, near Arcelia, in the *tierra caliente* region of Guerrero, used bat dung and earth from ant hills in the same way in dry season gardens planted in ravines (Brigida Solana, personal communication 2004).

carrier or other stinging ants that may otherwise attack the tender plants. Informants explained to me that this should be brought from a considerable distance so it will discourage ant colonies nearer the river from entering the gardens.

I discovered another crucial factor in the success of these gardens: careful control of soil and plant temperatures is especially important given the cumulative impact of long, hot sunny days on the shadeless river bed. Nahuatl informants explain that heat accumulated in the sand from intense sun, as well as strong direct sun can burn—or as they say, “cook”—the plants, especially tender growth. There are several solutions to this problem. The Nahuas cover newly sprouted plants during the hottest part of the day, and uncover them in the early morning or late afternoon; they use palm leaves, straw, dried grass or other materials for this purpose (figure 10). They spread cane from the inside of the organ pipe cactus or dry stalks from sesame plants on the ground and train spreading plants to grow across them to insulate them from the hot sand (figure 7). Another technique for controlling temperature of beds and plants is pouring or sprinkling water around the beds at different times during the day to cool the soil; gardeners also sprinkle the plants themselves with water to freshen leaves and flowers that might begin to wilt. In laying out the plots they plan for the growth of taller plants to shade others on the ground underneath. These activities do not entail heavy labor, but they require a constant presence and careful observation of the gardens and weather conditions on a daily basis

The amount of work lavished on these small plots was a particularly striking feature of my ethnographic observations. This effort is expended in building the terraces, digging the pits, planting and weeding the plots; it includes providing additional nutrients through gathering manure, wood ash, bat dung and soil from ant hills and transporting them to the *huertos*. But in addition, each bed and each plant is carefully observed and tended by hand on a daily basis. In the construction of the *huertos* Nahuas carefully control the levels of the beds for even water absorption, and dig small ditches or shallow wells and hand shape borders to hold moisture and the nutrients dissolved in water around the base of plants (figure 8). As I described above, the use of water and shade to control the soil and plant temperatures throughout the day also requires considerable attention.

I learned that energy and effort are also invested in aesthetic details; gardeners give great attention to aspects such as borders, divisions between beds, terraces, and barriers to keep out animals. They sometimes hand build



Figure 7. *Watermelon and squash plants trained across wooden poles and sesame straw to protect them from the hot sand.*

stone walls, stairs and paths within the plots which will be flooded each year at the end of the dry season (figure 9). The layouts of the *huertos* are quite striking; symmetry in the arrangement of the beds (figures 5 and 2), and the contrasting heights and colors of the plants and flowers as they mature are significant considerations and the Nahuas take this into account in their planning (figure 9).

During my fieldwork it was evident that they appreciate, sparse, clean lines surrounding the terraces and beds, and they enjoy the patterns created by spreading and climbing plants. They also derive great pleasure from the visual contrasts of lush growth with strong green hues against the white or beige sandy soil, the grey river rocks and gravel, and the dry burnt vegetation on the surrounding hills that serve as a backdrop. The amount of energy spent in the gardens is more than required for production, and these *huertos* and the attention lavished on them by the gardeners reminded me of Trobriand gardens. Malinowski (1984: 58-62) emphasized the importance of aesthetic considerations in the Trobriands and stressed that much more labor is invested in the plots than required for production. He discovered, as I have, that in non-western societies, in addition to providing basic foods, agricultural work



Figure 8. *Hand-formed circular borders to pool water at base of bean plants, note finger marks in sandy soil.*

can be an expression of identity and personal prestige, intimately tied to social personhood.

### *Gardens and Cultural Reproduction*

Families spend most of their days in these gardens, if not working directly at cultivating the plants, then in observing them and monitoring their growth, and in enjoying and refining aesthetic details. This means that the huertos are seasonally inhabited spaces where other kinds of activities also take place. Women wash and dry clothes and bathe their children in the river at the edge of their gardens (figure 10), and they may do some rudimentary cooking or at least heat food brought from the main house to eat there. Men often fish in the river and clean, salt and sun-dry their catch next to the planted beds. In addition to the gardens themselves villagers utilize other resources on the upper banks of the river in the immediate vicinity. Men and women gather and dry different fruits and seeds from trees in the countryside –especially



Figure 9. Garden construction techniques including thorny brush as a natural fencing material, horizontal log to form base of one terrace, hand laid stone wall and stairs carved into river bank.

guaje, guamuchil and xocote. Men sometimes hunt for small game and both men and women collect firewood in areas near the river.

If the *huertos* are an hours walk or more from their main houses families build provisional shelters and spend nights there where it is cooler and better for sleeping than in the village (figure 6). The fact that Nahuas pass so many hours in their gardens and even sleep there has important social implications. People gather to converse, gossip and socialize in the *huertos* that sometimes provide the space and opportunity for carrying on clandestine love affairs. Particularly at night Nahuas tell stories and observe astronomical phenomena –I discovered that children had learned the names of constellations in Nahuatl while accompanying elders in the gardens. In this sense agricultural practice provides for the transmission of other kinds of cultural knowledge that extends beyond the detailed information about local ecology also conserved through gardening.

For this reason multiple considerations enter into any assessment of the larger significance of this agricultural system. Obviously it provides crucial



Figure 10. Garden with bed covered in sesame straw to shade tender plants. Plants pictured include green beans, *caxtiltzin* beans, sunflowers, marigolds, onions, corn, *cilantro*, *epazote*, *camotes*, amaranth, corn, melon. Note woman washing clothes in river and mother preparing to bathe child.

resources for the survival of the families during the dry season, and complements harvests obtained from precarious rainy season *milpa* agriculture that are often insufficient to last through the year. The sale of some of the produce gives immediate access to welcome cash. But my fieldwork revealed that another primary motivation for planting these gardens is ritual life. An important part of the products from these *huertos*, especially herbs, flowers, green corn and fruit are used as offerings during the busy festive cycle during the dry season. Despite the apparently Christian symbolism of these festivals, most of the rituals are tied to a ritual geography; they relate to rain-making ceremonies and actions to ensure the fertility of seed and success growing corn in the upcoming agricultural season (Good, 2001a; 2001b; Broda, 2001; Broda and Good, 2004).

The celebrations using these items begin with Carnival and a fiesta for San Agustín, an important local saint who is celebrated twice: first on February 27 and 28 at the height of the dry season and again six months later on August 27 and 28, the dates that correspond with the Catholic calendar that fall during

the rainy season when *milpas* begin to mature. Weekly fiestas and pilgrimages take place through Lent, Holy Week and Easter. They are followed by celebrations from the 20<sup>th</sup> of April through the intense period of offerings from May 1-5 associated with the Santa Cruz (Broda, 2001; Good, 2001b). The demand for fresh flowers, melons, green corn and strongly scented greens in offerings on household altars, in the churches, and at altars marking places in the landscape (hilltops, springs, caves, ravines, territorial divisions) is a major motivation for making the gardens.

### *Final Thoughts*

The gardens described here require a great deal of very specific cultural knowledge, and they are based on collective accumulated observation of the natural environment by this Nahuatl group for many generations. The huertos de humedad represent a continuation of prehispanic agricultural tradition that probably dates from before Nahua occupation of the Balsas River valley ca. 1200 ADH. The techniques I documented may have been used on a larger scale in earlier historical periods although the historical origins and development of this type of garden requires further research and collaboration with archeologists. The ethnographic information here can be of use to archeologists in their analysis of prehispanic agricultural techniques. One difficulty in detecting this type of agricultural system is its ephemeral nature. Because the huertos are destroyed every year few vestiges are preserved from an activity that requires considerable labor and yields important amounts of food. The data presented here can alert researchers to the possibility of other agricultural forms that may be difficult to locate in the archeological record.

The *huertos* are still in production in 2004, although I collected most of my data between 1984 and 1991. The most significant changes in the 1990's have been the introduction of small pumps and the use of some chemical fertilizers and pesticides. The future viability of this form of gardening depends on other factors beyond the control of the Nahuatl villagers. A crucial concern is the continued deterioration of river ecology in the Balsas Basin that local informants relate to the disappearance of native fish and crocodiles beginning in the mid 1960's. This can be attributed to pollution from urban and industrial growth upstream and deforestation in the watershed. Dam construction along the Balsas has also altered the delicate ecology of the region, especially several large dams built downstream: the Infernillo Dam during the early 1960's and the Caracol Dam in the mid-1980's. In 1990 the continued existence

of all the villages where the *huertos de humedad* are still planted was threatened with the proposed construction of yet another large hydroelectric dam near San Juan Tetelcingo, whose reservoir would have flooded the communities from Mezcala to Ostutla and partway up the Amacuzac River, including the Olmec site of Teopantecuanitlan. Overwhelming local opposition to this dam and the lack of financing for its construction from the World Bank led to the suspension of the project in 1992. All these changes endanger the ability of local communities to continue planting huertos, and make recent ethnographic documentation of them particularly important.

I close this article with the suggestion that in considering the significance of traditional agricultural practices, we give careful attention to their social and cultural dynamics, as well as the sophisticated technological and ecological components of them. Ethnographic observation demonstrates that cosmological and symbolic understandings can be as important as the economic motives for agriculture in the Mesoamerican tradition (Good, 2001b; Broda and Good, 2004). In the case of the *huertos de humedad* described here, this explains in part the great effort expended on aesthetic concerns, the careful attention to detail, and the marked pleasure and satisfaction Nahuas experience in watching their gardens flourish. For these villagers social personhood is achieved through this kind of work; the successful application of specialized labor and knowledge in a complex, changing natural world reinforces personal and collective cultural identity as it ties them to their land and communities of origin.

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