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The Agrarian Diagnostic as a Tool for Archeological Conservation: The Case of the Farfacá Valley

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Abstract

This paper describes the methodology and results of an agrarian or livelihoods diagnostic undertaken as part of the Management Plan for the Farfacá valley Archeological Protection Zone. The authors characterized six production systems in the valley, and found that the areas with the least productive farming systems were most likely to suffer damage to cultural artifacts. Such a consideration of livelihood activities in the protection of heritage sites is an important innovation that should be incorporated into other such projects, as well as into the very laws that regulate the designation and protection of heritage sites.

Key words: agrarian diagnostic, livelihoods diagnostic, conservation of patrimony, Farfacá Valley

Resumen

Este artículo describe la metodología y los resultados de un diagnóstico agrario (o diagnóstico de vida) realizado como parte del Plan de Manejo para la Zona de Interés Arqueológico del valle de Farfacá. Los autores caracterizaron seis sistemas productivos del valle y encontraron que las áreas con los sistemas menos productivos presentaban más riesgo de daño a los artefactos culturales. Considerar las actividades vitales de la gente en la protección de sitios de patrimonio es una innovación importante que se debe incorporar en otros proyectos y en los mismos reglamentos para designar sitios de protección de patrimonio.

Palabras clave: diagnóstico agrario, diagnóstico de vida, conservación de patrimonio, Valle de Farfacá.

1. Introduction

The valley of the Farfacá river is a rural area that spans the Tras del Alto vereda of Tunja, Colombia, as well as veredas of the municipalities of Motavita and Sora. During the pre-colonial age, this valley is believed to have served as a ceremonial area for the Muisca town of Hunza (today's Tunja)[1].

The Farfacá valley is the site of a number of large boulders painted with pictograms. Neither the exact use nor the original dates for these paintings is known, but they are from at least the Muisca period and perhaps date back to the Herrera, over a millenium ago. The Farfacá valley is unique in the department of Boyacá for the number and extension of the painted boulders found there. For this reason the Grupo de Investigaciones Arqueológicas e Históricas de la UPTC university in Tunja has carried out a number of investigations in the area, touching on legal status of the stones[2], the local traditions and legends regarding the stones[3], and the conservation status of the paintings. A major goal of the research team is to have the Farfacá valley designated as an Archeological Protection Zone under the Colombian law Decreto 763 (2009).

The preservation of heritage sites depends not only on their historical value, on the legal regulations that protect them, or on their biophysical surroundings, but above

1 VILLATE SANTANDER, Germán (2001), Tunja prehispánica, UPTC, Colciencias, Tunja.

2 GONZÁLEZ BORDA, Juan Camilo (2009), Reconocimiento y protección del patrimonio arqueológico en el territorio de río Farfacá o Garbaquedaque, Undergraduate thesis, Facultad de Derecho y Ciencias Sociales, UPTC, Tunja.

3 PRADILLA, Helena et al. (2001), Farfacá: patrimonio cultural y natural de Tunja y Motavita, UPTC, Fondo Mixto de Cultura de Boyacá, Tunja.

all on the local people and their way of life. Local people are the determining factor in the protection or the destruction of heritage sites. The economic productivity of an area is intrinsically linked with the possibility of protecting its cultural, natural, or historical patrimony. People with few other economic options may destroy important sites or artifacts if their livelihood depends on it. In the case of the Farfacá valley, the rocks that serve as a canvas for the ancient paintings can also represent a source of income for local people if they dynamite them and sell them as gravel. In addition, the pictograms can be affected by local farming practices, such as the use of certain agrochemicals or the construction of reservoirs.

Too often the preservation of heritage sites is conceived of in an exclusionary way. There are many examples of the implementation of conservation plans in natural areas that prohibit local people from using their land as they see fit[4]. In historical or architectural conservation too, preservation often involves freezing a site in a sort of suspended animation that impedes its continued, living, present-day use. Examples are the conversion of the central districts of Cartagena or New Orleans from residential neighborhoods to tourist-focused areas, or the conversion of historic houses into museums.

A major part of the designation of an area as an Archeological Protection Zone is a Management Plan, consisting in a diagnostic component and a sustainability component. The sustainability component understandably includes a consideration of the productive vocation of the area, that is to say the economic (usually agrarian) activities that sustain the local people. If these activities harm the preserved heritage sites, they must be changed or abandoned, and if these changes imply hardship for the local people, then they should be compensated, or better yet the local people should be aided in the transition to less harmful practices.

Though the sustainability component of the Management Plan contemplates local livelihood issues, the diagnostic component is normally limited to pure conservation considerations. Along these lines, the Grupo de Investigaciones Arqueológicas e Históricas de la UPTC has compiled a catalog of the painted stones[5]. The research team classified them by zone, and assessed them one by one. For each boulder the team documented its paintings, the state of deterioration, and the surrounding vegetation. Each stone was also georeferenced using a GPS device, and repainted with the classification number that had been assigned to it in the 1990s during a first inventory of the rocks. Such measures of cataloging and marking patrimony sites are standard in conservation projects.

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4 See for example DEWAN, Shaila (2010), "Black landowners fight to reclaim Georgia home" in The New York Times, 30 June 2010.

5 PRADILLA RUEDA, Helena and VILLATE SANTANDER, Germán (2010), Catálogo de pictografías, moyas y rocas del valle de Farfacá de Tunja y Motavita, UPTC, Gobernación de Boyacá, Tunja.

However, the research team added a novel component to the diagnostic process: an agrarian diagnostic. From the beginning the researchers felt it was important to incorporate the present-day residents and their livelihoods into any plan to preserve the archeological patrimony of the Farfacá valley. It was clear that an eventual sustainability plan for the area would have to respect local peasant practices, and attempt to compensate any hardship that preservation of the stones might entail for the local people. To understand the economic conditions of the Farfacá valley, the team attempted to describe the productive activities of the zone. This implied that an agrarian diagnostic should be undertaken as part of the larger Management Plan diagnostic.

This paper describes the methodology and results of the agrarian or livelihoods diagnostic, as well as its implications for the Management Plan of the Farfacá valley. The consideration of productive activities in the diagnostic of heritage sites is an important innovation, and should be incorporated into other projects to protect heritage sites, as well as the very laws that regulate the process of designating and protecting these sites.

2. Methodology

To carry out the agrarian diagnostic of the Farfacá valley, the research team employed the methodology taught at the Institut des Régions Chaudes Supagro in Montpellier, France. A detailed treatment of the methodology is found in *Initiation à une démarche de dialogue: Étude des systèmes de production dans deux villages de l'ancienne boucle du cacao (Côte d'Ivoire)* by Ferraton et al, 2002. This methodology draws its inspiration from the agrarian systems vision articulated by Marcel Mazoyer[6], though the details of the analysis methodology go back to the pioneering Russian thinker of peasant economy, Alexander Chayanov[7].

The agrarian diagnostic is a method for discerning the agricultural, social, and economic reality of a given zone. It employs a sequence of five steps that lead from large-scale analysis to specific cases, which in turn allow a return to the large scale and enable generalizations about the typical economic activities of the area. The diagnostic is carried out over many days, ideally about two weeks, with a large group of professors and students. The work alternates between field visits in the morning, and synthesis and discussion in the afternoons at a central meeting point. The sequence of steps is as follows: landscape observation, land use history, cropping systems, farming systems, and a restitution to local people.

For the first step of landscape observation, the large group of students and professors is split into smaller subgroups. Each subgroup travels the area by foot, noting

[6] MAZOYER, Marcel and ROUDART, Laurence (2002), Histoire des agricultures du monde: Du Néolithique à la crise contemporaire, Éditions du Seuil.

[7] CHAYANOV, A. V. (1986), The theory of peasant economy, University of Wisconsin Press, Madison.

traits of geography such as relief, waterways, soils, natural vegetation, cultivated vegetation, housing, roads, animals, and any other feature that they observe that can explain the present-day arrangement of the territory. In the afternoon the subgroups return to the central meeting point. Each subgroup prepares a synthesis of what it has observed in the day, trying to draw out trends and generalizations (i.e. "in the upstream areas potatoes are more common, while downstream there is mainly pasture with grazing cattle"). It is important to report only what has been seen, without a priori interpretations of it. A good way of organizing the day's information is for each subgroup to draw an archetypal transect of the zone on a poster, showing the features typical on high land, low land, wet land, land near houses, etc. Finally the subgroups present their syntheses to one another, and the professors help the large group to articulate the generalizations that seem to be operating in the zone. The next day or two are also dedicated to landscape observation, but now informed by the generalizations proposed the prior day, which will serve as working hypotheses to test with further observations, and even through informal questioning of local people encountered during the exercise.

The second step of the agrarian diagnostic is to compile a history of changes in land use in the area. The landscape observation of the first step has explained what features exist today in the area, but it is impossible to know why those things are as they are without understanding the historical dynamics of the zone. The best way to gain such an understanding is by interviewing older local residents, who can tell how the land use and economic activities have changed over the past few generations. Subgroups again spend the day in the field, finding and interviewing older people. These interviews must be semi-structured, and undertaken with a spirit of respect and equality between interviewer and interviewee. The researchers do not want to impose their pre-conceptions on the subjects, or merely to confirm their own ideas. Hence it is always best to ask open questions like, "What did your parents plant when you were growing up?" As opposed to, "You've always planted corn in this zone, right?" A good point of departure is to explain the observations the researchers have made in the prior days, and ask questions about things they have noticed. Again, every afternoon the subgroups convene in the central meeting point, prepare posters to synthesize their findings, and present their posters to one another, while the professors attempt to tease out generalizations and new working hypotheses to test. This step can also extend for two or three days.

The third step is to describe the cropping systems in the zone. By now the group should have a general idea of the predominant economic activities of the area, so this step gives a more detailed look at the logistics and economics of these activities. A cropping system is defined as a way of managing a given piece of soil,

and can be considered largely synonymous with a crop rotation. Usually farmers practice multiple rotations within their farm, each rotation corresponding to a different type of soil, land ownership, or proximity to their home. Through interviews with farmers the subgroups are to document what rotations exist, the succession of tasks carried out in each cropping system, the tools used, the time in man-days dedicated to each task, the inputs used, the production that comes out of the rotation, and any other pertinent details. Again, in these interviews it is important to be concrete but not to lead farmers with biased questions, especially when discerning the crop rotation employed. In the afternoon, when subgroups organize summaries of their findings for the day, a useful format is a timeline for each crop rotation, called the technical itinerary, showing the activities undertaken in a cropping season, the labor employed for each activity, the inputs used, and the outputs produced. The same treatment is given to livestock systems, and even to non-agricultural activities. For example, in the Farfacá valley many people engage in exploitation of rocks and quarries for sale as gravel, or they work in other jobs in Tunja.

For each cropping system (or livestock system or non-agricultural economic activity) it will now be possible to calculate the gross value created the system. This is gross production value minus the inputs used. Both produce sold off the farm and produce consumed by the family are considered in this calculation. It is then possible to compare one activity system to another in terms of gross value created per hectare or per man-day.

The fourth step is to characterize production systems in the zone. The production system differs from the cropping system in that it is the global combination of activities that a particular farm engages in. That is to say that if a farm has a rotation of irrigated crops, another area dedicated to dryland crops, some dairy cattle, and one family member works in the iron-smelter nearby, then there are four activity systems, and the production system for that farm is the total of those activities. Whereas the idea of cropping system is somewhat abstract, because a single cropping system usually can't operate without other systems with which it interacts, the production system is a real phenomenon, what a farm actually does. A useful representation format is a global calendar of a production system's tasks and the work invested in each task, measured in man-days. As with the prior steps of the agrarian diagnostic, this one involves multiple days of field interviews and synthesis work. However, most of the information necessary to elaborate the production system should have already been collected during the third step of the diagnostic, and now it should only be a question of combining the information. That said, there are always details that are found missing in this step, for which it is necessary to go back into the field to fill in knowledge gaps with farmers.

As in the third step, the step of production systems involves the description of specific

cases in order to arrive at generalizations. If the group has seen that there are six major production systems in the zone, and that farmers practicing a given system share more or less the same characteristics, then a detailed description of one farm in the system serves as a general description of the dynamics of that production system. In this step the final result will be a calculation of the net value created by a given production system (the sum of the gross values of each cropping or activity system, minus farm-wide expenses such as irrigation costs or equipment depreciation). From this one subtracts distribution costs like taxes or wages of full-time employees, in order to arrive at farm family income. One can compare this income per hectare and per man-day between systems, which gives an objective understanding of the productivity of each system. The information about climate, geography, and history obtained in the other steps of the diagnostic explain why some farmers select one system, and others another, and why not everyone simply practices the most profitable production system.

The final step of the agrarian diagnostic methodology is a restitution of results to the local inhabitants of the zone. This is obviously a way of thanking and acknowledging local participation in the process, by making available to everyone the valuable information obtained in the exercise. But it is also a valuable tool for verification and correction of the diagnostic's findings. Even a well-done diagnostic is ultimately based on the observations and interpretations of outsiders, so there are often points that the research team has missed, which can be corrected or filled in during the final presentation.

The research team spent two weeks in October 2009 carrying out the agrarian diagnostic in the Farfacá valley. The team devoted 2 days to the landscape observation, 2 days to the historical reconstruction, 2 days to cropping systems, 3 days to production systems, and gave the restitution presentation a few weeks after finishing the fieldwork. Researchers did not spend the night in the zone during the diagnostic, because Tunja, where all the team members live, is very close to the Farfacá valley. It was possible to arrive every morning at the Florencia school (the team's central meeting point, at the edge of the Farfacá valley), do a debriefing, and carry out fieldwork for the entire morning. The researchers would then eat lunch at the school, do synthesis work, and return to Tunja in the evening. Five students participated in the exercise, as well as five professors and academic professionals.

The agrarian diagnostic, which the authors termed a livelihoods diagnostic in the case of Farfacá because of the high prevalence of non-agricultural employment, is a valuable tool for understanding a target zone. In the case of Farfacá, such an understanding was obviously the primary purpose, because the goal of the research was to give more value and insight to Farfacá's designation as an Archeological

Protection Zone, and especially to the future recommendations of how best to preserve the pictograms of Farfacá. However, there are two other important features of the agrarian diagnostic methodology.

Firstly, the agrarian diagnostic is a valuable pedagogical exercise. It teaches students and professors the importance of observing and listening, and an effective way of moving between formulation of working hypotheses and testing them. It is an interdisciplinary exercise that employs agronomy, geography, social research, and many other fields, and is thus enlightening to practitioners in these and other disciplines. New concepts are gradually introduced throughout the process, so there is a back and forth between theory and practice, generalities and particulars. The synthesis process at the end of every day teaches students how to summarize their observations and thoughts in an organized fashion, as well as how to present them and combine them with the observations of others.

Secondly, the agrarian diagnostic methodology creates new attitudes and relationships between students, professors, and local people. It undoes the hierarchical relationships of much research and teaching, because all actors are co-producers of knowledge. Students can have certain observations and insights that the professors don't, and local peasants are the ultimate authorities on the realities being studied. It is a true collaboration that not only increases trust between all actors, but that changes both their consideration of the other, and their consideration of themselves.

All these secondary benefits of the agrarian diagnostic clearly make it a useful methodology for improving future collaboration between people in the zone studied, as well as a training for conducting agrarian diagnostics in other zones. But even for students or professors who will never again participate in an agrarian diagnostic exercise, the methodological learning and the collaborative attitudes fostered by the process will be of benefit in any future work that demands collaboration between professionals and local people, as well as multidisciplinary, insightful consideration of a given reality.

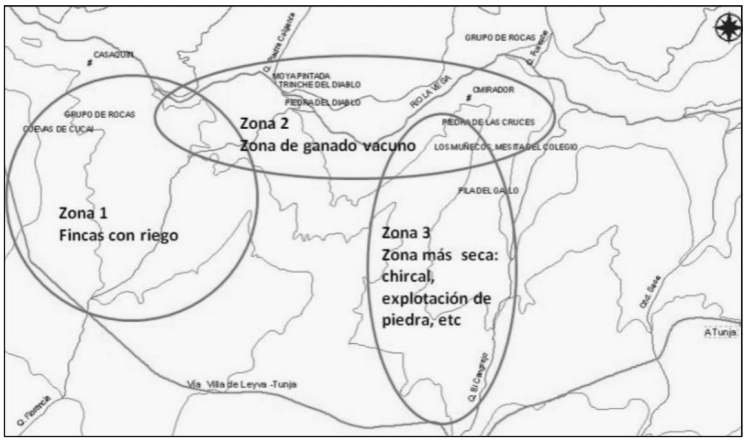
3. Results

Below are reproduced the general results of the different steps of the exercise (except for the restitution).

3.1 Landscape observation

The observation of the landscape revealed three major zones in the Farfacá valley. Zone 1 has a diversity of microclimates and hence of economic activities. It is located in the southern part of the valley, towards the border with Sora. The land here is densely populated and intensively farmed. There is generalized access to irrigation water here, which is pumped from the river into the countless excavated reservoirs that dot the hillsides. This part of the Farfacá valley is dominated by the

El Molino farm and a few others alongside the river, which use large amounts of irrigation water. However, even the farms farther up the hillsides in this zone have full reservoirs, and their crops appear well-watered. The El Molino farm is an example of a family that doesn't live in the area but maintains a weekend getaway there, as well as an agricultural project staffed by employees.



Farther downriver is zone 2, also called La Vega, where there are fewer crops but more prevalence of dairy cattle. The hillsides in this zone normally have no crops but rather pasture and native vegetation, and the valley floor is wide and flat, somewhat waterlogged but with abundant pasture growth.

The climb from this zone towards the Tunja-Villa de Leyva highway leads through zone 3, also known as the Peladeras. Here there is little cultivation, and much vegetation typical of dry areas, such as hayuelo (*Dodonaea viscosa*). In this area of the Farfacá valley one finds many chircals (artisanal brick ovens), quarries, and even direct exploitation of rocks with dynamite. In terms of animal production there are sheep and cattle whose natural pasture-feeding is complemented with potatoes and forage from other production areas. In zone 3 there are many abandoned houses, as well as houses inhabited by elderly couples whose children live and work in Tunja, sending money to maintain the parents. Also in zone 3 there are young people who live in the area but work in non-farming industries, such as brickmaking or metalwork.

3.2 Productive history in the zone

The older residents of the Farfacá valley spoke of a number of important events in the past:

- Before 1950 the territory was divided

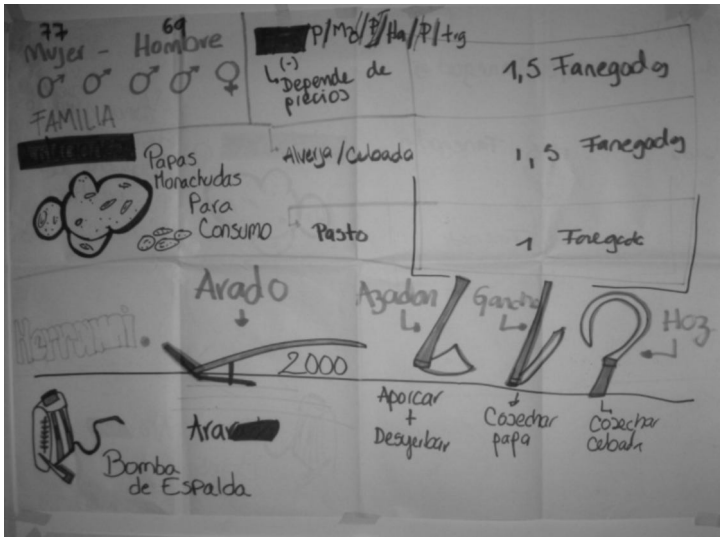
between the Estanzuela hacienda and the Florencia hacienda. In each hacienda lived the owners in their house, and on the haciendas' lands lived various families with their own "ranchos". In return for the use of the land for farming and animal raising, these families had to share half their production with the owners, in an arrangement known as "mitaseo".

- There was a Camino Real road from the colonial era that linked Bogotá to Tunja and continued on to Chiquinquirá, passing through the Farfacá valley on its way. This path is still demarcated by old walls in the area.
- In the 1950s the current highway between Tunja and Villa de Leyva was constructed, which passes along the eastern edge of the Farfacá valley.
- In the 1950s there was also a process of division of the haciendas. In some cases the owners sold to the other families that lived there, and in other cases the State divided up the haciendas.
- From the middle of the 20th century until the 1980s agriculture remained the major economic activity, and the main crops were wheat, barley, and potato.
- After this period came the first trade liberalization measures in Colombia, which caused a drastic fall in the price of wheat and barley that rendered them economically nonviable crops.
- As a compensatory measure, the national government and Bavaria beer company, which had until then bought barley from residents of the Farfacá valley, provided Motavita and other municipalities with backhoes so farmers could dig reservoirs that would permit the planting of new crops that needed irrigation, such as oats, onions, and peas.
- The unregulated construction of these reservoirs has led to a decrease in the level of water flowing in the Farfacá river, which residents also attribute in part to changes in the amount and regularity of rains in the past 30 years.
- At the end of the 1990s the area was first hit by the pest known as Guatemanteca or polilla guatemalteca (*Tecia solanivora*), which caused a decrease in potato production and profitability.
- In the year 2000 the deep well Guadalupe was drilled. It serves to irrigate the fields above the highway (outside of the study area).
- Also in 2000 the Manzano quarry began to operate above the highway, and in the study zone various secondary roads were constructed, which permitted better access to certain areas of the Farfacá valley rich in quarries and boulders.

3.3 Cropping and other activity systems

Because classification of cropping systems is only an intermediate step in the agrarian diagnostic process, this article will not enter into a detailed

discussion of the results. However, below is an example of a typical poster prepared during this phase of the exercise.



Above is the description of the rotations practiced by a farm in zone 3 (the driest part of the valley) by a man of 69 and his 77-year-old wife. One rotation practiced on 1.5 fanegadas (1 ha) is potato/corn // potato/fava beans // potato/wheat (with a double line separating the crops planted in a given year, and a single line separating crops planted in the same year), while another rotation carried out on another hectare consists in peas/barley every year. On another fanegada (0.67 ha) this couple has pasture. The tools used for these rotations are a plow, a hoe, a "gancho" for potato harvesting, a sickle for grain harvesting, and a backpack pump for chemical application.

A final note about the different cropping systems is that potato and onion cultivation, as well as quarry exploitation, are the highest-value activities in the valley, both per-hectare and per man-day. Peas and dairy are moderately productive in land and labor terms, and grain farming is the least productive activity.

3.4 Production systems

The researchers found six major production systems in the Farfacá valley. It is important to note that these are archetypes. Individual farms follow the general characteristics of one system or another, though they may vary slightly in certain details.

- System 1: Constant onion/potato rotation in farms of 0.5-2 ha. This system is practiced in zone 1, upriver at the river's edge. This system employs many chemical inputs bought on credit, as well as using large quantities of irrigation water. It is not associated with other cropping or livestock systems. Those who practice this system rent land, for which they pay the owner a portion of the harvest. These renters use their own labor, as well as occasionally hiring day laborers for certain tasks.
- System 2: Intensively-raised dairy herd on 20 hectares. This system is only practiced on one farm in the valley, but because of its large size and its high water consumption (from a position at the headwaters of the valley), the system impacts all the other farms in the area. The system depends on a mix of planted pastureland and land planted to corn for silage. All the land is irrigated, and there are many capital investments such as machinery and stables, but use of agrochemicals is low. This farm employs only contracted workers, because the owner lives in Bogotá.
- System 3: Extensively-raised dairy herds on 6-8 ha. This system is practiced in zone 2, the middle part of the Farfacá valley known as La Vega. It does not employ purchased inputs and has few capital investments, but the pastures benefit from passive irrigation from old canals dug out from the river's headwaters and extending the length of the valley. The system uses only family labor.
- System 4: Irrigated potato, peas, onion, and pasture on 2 hectares with dairy cattle, sheep, and rock quarry. This system occurs throughout the Farfacá valley, though with variations in water access, size of animal herd, and the incorporation or not of quarrying in the system. The cows are integrated with the crop rotation because they consume pasture and add organic matter to the soil. The sheep often pasture in lands off the farm, and are exploited for their lambs and their wool. Apart from irrigation, this system doesn't have many capital investments, and uses few chemical inputs except with the potato and onion. These farms use family labor, with day laborers hired for certain tasks. Quarry exploitation is performed by hand and with dynamite, using family and hired labor.
- System 5: Potato, wheat, barley, and peas on 3-5 ha, with chircal (artisanal brick oven), quarry, off-farm work, or exploitation of rocks. This system is practiced in zone 3, the Peladeras, using family labor. It is a variation of system 4, but without irrigation, which makes farming precarious and unprofitable. Non-farm activities are more important than farm activities in this system.
- System 6: Quarrying. This is a non-farming system carried out by people

who rent land. The renter works himself, as well as contracting workers. The tools employed are simple iron bars and levers, and the main input is dynamite.

4. Discussion

To classify different production systems as economically viable or not, the authors set a minimum threshold of 80% of the legal minimum wage in Colombia, or 412000 pesos a month. It was reasoned that if a young person can remain on the family farm and earn 80% of the minimum wage, he or she will not have a strong motive to go to the city and look for work that is less assured than on the farm. It is true that older people can accept or simply tolerate incomes much lower than the minimum wage without leaving the farm, but if their children don't stay, this indicates that the farm is not viable, and the next generation will either have to sell it or change the production system practiced.

Below is a reproduction of the poster displayed at the restitution of results to local farmers. It depicts the monthly per-person income generated by each production system.

Using the threshold figure of 412000 pesos a month to indicate viability, it is evident that systems 1 (onion and potato) and 6 (quarrying) are very attractive, with respective earnings of 1.5 and 1.25 million pesos a month per person. System 4, the irrigated mixed cropping system, would not be viable if only for the crops, which bring 294000 pesos per month, though in flatter, larger parcels it is possible to increase per-person income by mechanization. System 4

becomes barely viable (486000 pesos per month) when one adds in livestock, and it is made appreciably more profitable with the incorporation of quarrying, which brings per-month income to 652000 pesos.

The extensive dairying system, system 3, almost achieves economic viability (362000 pesos per month), and would become attractive if only one worker managed the herd instead of the two that the researchers considered in the exercise. It is apparent that the dryland farming system 5 is not at all satisfactory, with a monthly income of 82000 pesos, and this is counting the incorporation of artisanal brick-making, which is the only profitable component of the production system. The intensive dairying operation, system 2, creates a negative income for the owner, and is only maintained because the owner earns his livelihood with a business in Bogotá, and his activities in Farfacá count almost as a hobby.

It becomes clear then that certain production systems are less viable than others, and it so happens that these systems occur in the areas where the research team has ascertained that the rock pictograms are most at risk. The interpretation is that in cases where farming is not a viable option, namely in zone 3 or the Peladeras, people must supplement their income with nonfarm activities. The three most prominent of these possibilities, brickmaking, dynamiting of rocks for gravel, and quarrying, are all potentially destructive to the archeological patrimony of the Farfacá valley. Knowing this, it is clear why the destruction of rocks has thus far been concentrated in zone 3, and it is possible to better direct efforts to preserve the rocks. Thus the results of the study confirm the importance of including the agrarian diagnostic exercise in the process of designating Archeological Protection Zones. Had the researchers not performed the agrarian diagnostic, it would remain a mystery why some people destroy rocks and others don't, and the authors would have no idea of the best way to prevent further destruction.

Conclusions

The Grupo de Investigaciones Arqueológicas e Históricas de la UPTC is determined to protect the unique painted rocks of the Farfacá valley through the declaration of an Archeological Protection Zone. In addition to the standard process of cataloging and describing the state of preservation of these historical artifacts, the group carried out an agrarian diagnostic of the area to learn about the economic situation of local people. This diagnostic thus gave an idea of the threat that people's livelihoods may pose to the rocks, as well as effective ways to prevent such damage.

The researchers employed the methodology of the agrarian diagnostic, which the team re-named the livelihoods

diagnostic in consideration of the prevalence of non-agrarian activities practiced in the Farfacá valley. This method consists in five successive steps that result in an accurate characterization of the different economic activities of an area, culminating in the comparison of economic productivity between production systems. The agrarian or livelihoods diagnostic is not only an effective means of understanding the livelihoods and the inner workings of a determined area, but it is also an effective tool for teaching research methods and changing the hierarchical relationship between students, professors, and local people.

Thanks to the diagnostic, the researchers discovered that dryland farming systems, concentrated in one part of the valley in particular (zone 3 or the Peladeras), are simply not viable economically. People in this zone, practicing these unproductive systems, are not able to make a dignified living from their agricultural activities. The elderly living in this zone accept their low income, and sometimes augment it with money sent from their children working elsewhere. Others in the Peladeras zone supplement their meager farm income with off-farm work in the city or factories. But a certain number make up the farm income shortfall by practices such as quarrying, brickmaking, or outright dynamiting of boulders to sell as gravel. These activities are inherently destructive of the culturally-significant rocks and the landscape that surrounds them.

It is thus clear that the greatest risk to the rocks exists in zone 3, where poverty drives people to engage in activities that can destroy painted rocks. Any attempt to preserve this cultural heritage must focus on the Peladeras zone of the Farfacá valley, and the unprofitable production systems practiced there. Conservation efforts must propose alternatives for these people and these production systems. The future Management Plan for the Farfacá valley will include the following recommendations, informed by the livelihoods diagnostic:

- Promotion of onions, potatoes, and animal husbandry within the existing production systems. These activities are profitable, so they can reduce local inhabitants' dependency on activities that damage the painted rocks (brickmaking, quarries, etc.). The promotion of potato and onion cultivation has its limits though, because both crops require large amounts of water, and involve heavy use of toxic agrochemicals. Furthermore, not all soils are suited to cultivating potato and onion.
- Integrated pest management for the Guatemanteca moth, which wreaks havoc on the potato crop and thus diminishes farmer productivity and profit.
- Extensive pasturing of dairy cows, in addition to being profitable, is the agricultural activity that has the least negative impact on the rocks. Its effects can be further reduced through the planting of native bushes

and trees around the rocks, or simply by fencing around the rocks to prevent grazing and to permit natural regeneration of native vegetation. The process of cataloging the rocks (which occurred at a different moment than the agrarian diagnostic) showed that the rock paintings seem to be better-preserved where rocks are protected by native vegetation.

- The promotion of onion and potato crops implies a more general availability of irrigation water. Since water is a limited resource in the Farfacá valley, it is necessary to manage river water communally in order to provide access for all farmers. The farms closest to the river should not appropriate this precious resource such that others have no access. The local environmental agency, Corpoboyacá, already has rules in place to this effect, but they must be enforced, and the community must come together to manage irrigation water justly.
- Perhaps the most obvious solution, but also that requiring the most coordination to implement, is the creation of ethno- and eco-touristic paths focusing on the painted rocks. The people of the Farfacá valley can thus receive a direct economic benefit from the rocks, through working as tour guides, collecting entrance fees to the zone, and offering food and lodging to tourists. This would motivate everyone to preserve the valley's archeological heritage.

The incorporation of the agrarian diagnostic into the process of elaborating a Management Plan for the protection of cultural patrimony was very useful in the case of the Farfacá valley, and the authors believe that such a consideration of livelihoods would be valuable in all such conservation efforts. Cultural, historical, archeological, and even natural heritage loses its meaning when divorced from surrounding human realities. Hence the protection of this heritage also needs to consider the human context in which the patrimony is located. The agrarian or livelihoods diagnostic is a crucial tool for understanding this human context.

Were it not for the agrarian diagnostic, those who work to protect the Farfacá valley's cultural sites would still be stuck, so frustrated with local people's endangering of this valuable heritage as to consider their expulsion from the zone as the best means to protect the rocks. This would not only be impractical and immoral, but it would create yet more displaced people in Colombia! But thanks to the comprehensive look offered by the agrarian diagnostic, the authors are now able to articulate innovative solutions to problems of archeological conservation. Without the agrarian diagnostic, would anyone imagine that the best way to preserve ancient art is perhaps by improving distribution of agricultural irrigation water, or by better controlling a potato pest?

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