



Integrating soil survey, land use management and political ecology: A case study in a border area between Peru and Ecuador



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ABSTRACT

In Latin America countries, competition for access to natural resources among different groups has been a major reason for the outburst of violence over the last decades. One of the main aims of the political ecology concerns the understanding of the environmental conditions that can underlies the social conflict among people. Such understanding needs to be based on a detailed investigation of the natural resources of the landscape, mainly the soils. Few years ago the Italian Ministry for Foreign Affairs financed a soil survey with a humanitarian purpose: the development of a peace plan between Peru and Ecuador by improving the socio-economic conditions of the rural populations living in the areas close to the border. To achieve such goal, the construction of an irrigation canal was planned to irrigate few hundred hectares in the province of *Ayabaca*, on the border between Peru and Ecuador. To be soundly planned and designed, the canal project was obviously based on a preliminary soil survey that is essential to assess the irrigation suitability of the land. In this work, the authors illustrate the soil characteristics within the study area, their suitability for irrigation and the key aspects for future land uses, highlighting the philosophy followed in applying the land evaluation system which took into consideration the social, cultural and humanitarian purposes of the soil survey. Results proved the feasibility of the financed project and the potential increase of the living conditions of the rural people.

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Introduction

In several areas of the world, the rising of rural populations has threatened the conservation of the natural resource that underpins livelihoods and provides ecosystem services from local to global in scope (Swinton et al., 2003). Weiner (1978), more than thirty years ago in his classic *Sons of the Soils*, recognized the potentially explosive situation stemming from clashes between migrant and indigenous populations. In a broader sense, it is evident that some of the worst ethnic violence in the last centuries has involved the annihilation of indigenous groups by ethnically distinct settlers bearing “guns, germs, and steel” (Diamond, 1997; Mann, 2005). Nonetheless, in the recent cross-national, “micro-level,” and case study literatures on civil war, sons-of-the-soil dynamics and their frequency have been largely missed (Fearon and Laitin, 2009). What has happened in many African countries (i.e. Angola, Sudan) and in some areas of Latin America are good examples of these problems.

Particularly in Latin America countries, competition for access to natural resources among different groups has been a major reason for the outburst of violence over the last two or three decades,

resulting in human casualties, devastation and deprivation (De Wit and Verheye, 2002; Swinton and Quiroz, 2003). Where agriculture is the mainstay of the economy of these countries, limited essential physical resources, such as good quality soils and good quality water, the lack of energy and of appropriate technologies necessary for increasing food production, may drove people to extreme poverty, triggering often cruel social conflicts and life-and-death struggle. Sustainable agriculture is likely to provide the long-term benefits required to achieve development and poverty alleviation. Proper planning and management of the available resources is necessary to ensure maintenance of their production potential, quality and diversity. While the needs of the modern world require new approach in land evaluation for environmental and ecological issues (FAO, 2007), in several areas of the world, land evaluation has to focus mainly on rural development issues.

Several authors, have outlined that from the 1990s, political ecology has typically questioned a certain taken-for-granted aptitude on environmental issues in the developing Countries and deconstructed notions such as scarcity, overpopulation, degradation, and carrying capacity (Leach and Mearns, 1996; Forsyth, 1996; Kull, 2004; Benjaminsen et al., 2006, 2010; Mehta, 2007). One of the main aims of the political ecology concerns the understanding of the environmental conditions that can underlies the social conflict among people (Forsyth, 2008). Such understanding needs to be based on a detailed investigation of the natural resources of the

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Fig. 1. The study area, indicated by a circle, lies in the northern part of Peru, region of Piura, very close to the border with Ecuador.

landscape and, mainly the soils (Dazzi, 2008; Benjaminsen et al., 2010). Soil surveys in particular, supply the information necessary for economic analysis and land planning and, in many situations of competition for access to natural resources among different social groups, are often financed by overseas aid. Following political ecology criteria, which quoting Benjaminsen et al. (2010) “need to be grounded in detailed natural science-based investigations”, few years ago, the Italian Ministry of Foreign Affairs, financed a soil survey with a humanitarian purpose: the development of a bi-national peace plan between Peru and Ecuador.

Peru and Ecuador share a lengthy border which, particularly on the West area, is characterized by landscapes with arid and semi-arid woodlands. In the previous century, precisely in 1941, in 1981 and in 1995, these Latin American neighbours fought three wars over a region known as the *Cordillera del Condor*. On 26 October 1998, after much bloodshed, and from 1995 onwards much negotiation, the two Andean nations signed a peace agreement. However, despite the peace agreement, the age-old drive to expand agricultural areas by the border populations, has continued to make relations between these neighbouring countries unstable.

With the aim of improving the socio-economic conditions of the border area populations, to avoid further clashes and as part of an anti-poverty programme, the Italian government planned the construction of a 7 km long irrigation canal, to irrigate an area of a few hundred hectares in the province of *Ayabaca* (*Suyo* region), close to the border with Ecuador.

In this paper, as an example of political ecology analysis, we wish to illustrate the survey that was conducted¹ as a prerequisite for financing the canal, highlighting: (i) the soil characteristics within the study area; (ii) their suitability to irrigation using the water brought from the *Quebrada de Suyo* (*Quebrada*: Spanish for gully); (iii) the key aspects for future land use arrangements as result of transformation from dry farming to irrigated agriculture and (iv) the philosophy followed in applying the chosen land evaluation system.

The study area

The study area (Fig. 1), according to information supplied by the Transitional Regional Administrative Commission (CTAR) of



Fig. 2. Flowering Borrachera (*Ipomoea carnea* Jacq.). This poisonous plant is widespread in the study area.

Piura (the capital of the homonymous region that encompasses the study area), is situated inside the *Caserío Las Monjas* (*Caserío*: Spanish for hamlet), a hilly area of northern Peru, close to *Suyo* town (Province of *Ayabaca*, Peru), from which is connected by a dirt road, approximately 10 km long, about 45 min of travelling time. *Suyo* is connected to *Sullana* (the capital of the Province) by a 100 km long tarred road (about 90 min of travelling time). In the *Caserío*, which is 40,295 ha wide, live the *Pampa Larga* farmers community (around 3200 habitants) that are mainly stock-breeder. There are around 21,000 animals (17,000 goats and 4000 cows). The social organizations that manage the *Caserío* are the vice-governor, the club of the fathers, the club of the mothers and the farmer’s patrol.

The *Caserío Las Monjas* area is a dry, dense or semi-dense woodland (locally called *bosque seco*, Spanish for dry woodland) where, along with several species of cactus (*Cereus* spp.), carob (*Prosopis lirnensis*) and kapok (*Ceiba pentandra*), a shrub, locally called *borrachera* (*borrachera*: Spanish for intoxication), plays a fundamental role. Borrachera (*Ipomoea carnea* Jacq.) is a shrubby, perennial, semi-woody, upright plant, approximately 1.5–2 m tall, with light green leaves and tubular purplish-coloured flowers (Fig. 2) that, due to the presence of a lysergic acid alkaloid derivative in its leaves, fruits and seeds, can have toxicological effects on animals which ingest it and which may lead to death (Meza de Hurtado, 1994). Areas turned over to rainfed cultivation are few in number and randomly scattered. The irrigated agriculture areas and those mainly used for vegetable gardens (for the production of corn, cassava, sweet potatoes, beans, onions and bananas) are small, oasis-like, located close to the *El Huasimo* stream course and a little bit far from the *Caserío*.

Lithology characterizing *Caserío Las Monjas* area traces back to the Upper Cretaceous – Lower Tertiary, and consists of intrusive granite and granodiorite rock types (pers. comm. from W.Z. Calderon Castillo, University of Piura, Peru). These rocks are intensely weathered and, in some areas with a predominantly concave morphology, sediments resulting from their alteration have given rise to sedimentary deposits. The action of morphogenetic agents on these rocks has resulted in a hilly morphology, with altitudes ranging from 250 m to 400 m a.s.l., with frequently wide and rounded peaks. Slopes of different gradients radiate from these peaks (Fig. 3). Some of these slopes taper into a basically nearly flat morphology, which is at times concave but, more often the slopes are steep, such as those along the *Suyo* River.

According to climatic data supplied by CTAR, average annual rainfall is around 470 mm concentrated in the summer-autumn period (63% falling in autumn months while 34% is recorded in the summer period). Spring and winter are characterized by an

¹ Considering the humanitarian purpose of the survey, it was carried out without any earnings.

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