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Horizontal and Vertical Archipelagoes of Agriculture and Rural Development in the Andean Realm

Christoph Stadel

Abstract

The tropical Andes offer a unique mosaic of physical and human environments. Since the pioneering field research of Alexander von Humboldt over 200 years ago, the Andean realm has been considered as a model for an intricate altitudinal zonation of climate, vegetation and agriculture. In addition to this, latitude, proximity to the Pacific Ocean or Amazon Basin, topography, hydrology and geomorphology enrich the variety of landscapes. In terms of agriculture and rural development, a corollary of other factors shapes the human landscape. Particularly significant among them are the ethnic affiliation of the population with their cultural heritage, the colonial and post-colonial imprint, land tenure, accessibility to roads and larger settlements, agricultural and non-agricultural opportunities, the access to and acceptance of innovations and modernization, and also the resilient capability of the rural population to adapt to climate change and to new cultural, social, economic, and political conditions. This chapter attempts to explore, in a summarizing fashion, the agricultural and rural archipelagoes of the tropical Andes in their horizontal and vertical dimensions. In a concluding part, the author critically examines some rural scenarios and postulates a “campesino-oriented development”.

Keywords: tropical Andes, rural and agricultural archipelago, horizontal and vertical zonation of landscapes, *campesino*-oriented development

The most profound meaning of the Andes comes not from a physical description, but from the cultural outcome of 10 millenia of knowing, using, and transforming the varied environments of western South America ([1]: 34).

1. Introductory remarks

Tropical mountain environments can be approached in a three-dimensional perspective taking into consideration the horizontal or lateral as well as the vertical dimensions of geographical space: Zimmerer [2] speaks of “vertical environments”. In the case of the tropical Andes, the configuration of the natural environments and of the human landscape is further differentiated by the extent of the Cordilleras on both sides of the Equator from the Caribbean coast (about 11°N) to the tropic of Capricorn (about 23.4°S). Facing the Pacific Ocean with its different ocean currents on its western side and the vast interior, lowland areas of the Orinoco, Rio Negro

and Amazon watersheds to the east furthermore result in a marked landscape contrast as one crosses the mountain ranges and highland basins from west to east.

As early as 1807, von Humboldt and Bonpland described the vertical arrangement of ecological zones in their famous illustration of climate and vegetation of the Chimborazo in Ecuador [3]. Troll [4, 5] and Lauer [6–8] described and compared the altitudinal zonation of climatic factors and vegetation in tropical mountains in general and also specifically in the Andes. They distinguished the principal zones of the *tierra caliente*, the *tierra templada*, the *tierra helada* and the *tierra nival* or *nevada* from the base to the top of high tropical Andean mountains. They further differentiated between the humid, semi-humid, semiarid and arid Andes and illustrated these zones by their famous three-dimensional altitudinal and latitudinal models. They also showed that the climatic characteristics of the tropical Andes have a major impact on land use, settlements and agricultural activities. Of great significance are in particular critical temperature thresholds, e.g. for the growth of specific tropical cultigens and of the occurrence of frost. In terms of humidity levels, the humid and semi-humid Andes are characterized by between 12 and 7 humid months (precipitation higher than potential evaporation), the arid and semiarid Andes by 6 to 12 arid months (evaporation higher than precipitation). In a generalized model, the author attempted to portray the altitudinal zonation of ecology, agricultural land use, settlements, and health risks for the humid and the semiarid and arid Andes (**Figure 1**).

A pioneering contribution to the concept of altitudinal ecological and human zonation was made by Murra [9, 10]. He states that life of the rural Andean world was shaped by the “verticality” of ecological conditions and that families, villages and ethnic communities have traditionally attempted to control as many micro-ecological zones as possible (*Control Vertical* or *Mitimagkuna*), the so-called *archipiélagos verticales*. Drawing on Murra’s work and based on his own research, Brush [11–13] distinguished three major types of control and integration of Andean ecological zones and resource areas. The “compact type” is one in which different ecological zones occur in close proximity to each other and are easily accessible to the community. In the case of the “archipelago type”, the ecological zones used by a group of peasants are more distant from each other and are often separated by unused areas, thus requiring more extended travel times. This may require the establishment of a series of permanent or semipermanent “colonies”, away from the home community, in these different ecological zones, as well as a system of exchanges between the home community and the colonies based on reciprocity and redistribution. In the “extended type”, each peasant group exploits a single or a few ecological zones, often specializing in certain products, and exchanges goods with other groups living and exploiting other ecozones ([11]: 292–295). In a summarizing overview, Forman [14] has discussed the “verticality concept” with its implications and applications for the Andes. She comes to the conclusion that the verticality models still provide useful guidelines for rural development in the Andes.

In a rather provocative paper, Allan [15] had rejected the “environmental determinism” of traditional altitudinal zonation models, arguing that they are “no longer suitable for characterizing mountain ecosystems now that human activity is directed to new motorized transportation networks linked to a wider political economy and no longer dependent on altitude” ([15]: Abstract, 185). Instead, he proposed an “accessibility model” of land use in a hypothetical mountain landscape. While mountain geographers would agree that a simplistic and unrestricted environmental determinism has to be rejected, many of them (among them [16]: 197–198), based on their empirical findings, have taken the position that mountain people for a long time have adapted to the geofactors of altitude, relief, distance, climate, vegetation, soil and hazard exposure, while recognizing that new developments, among

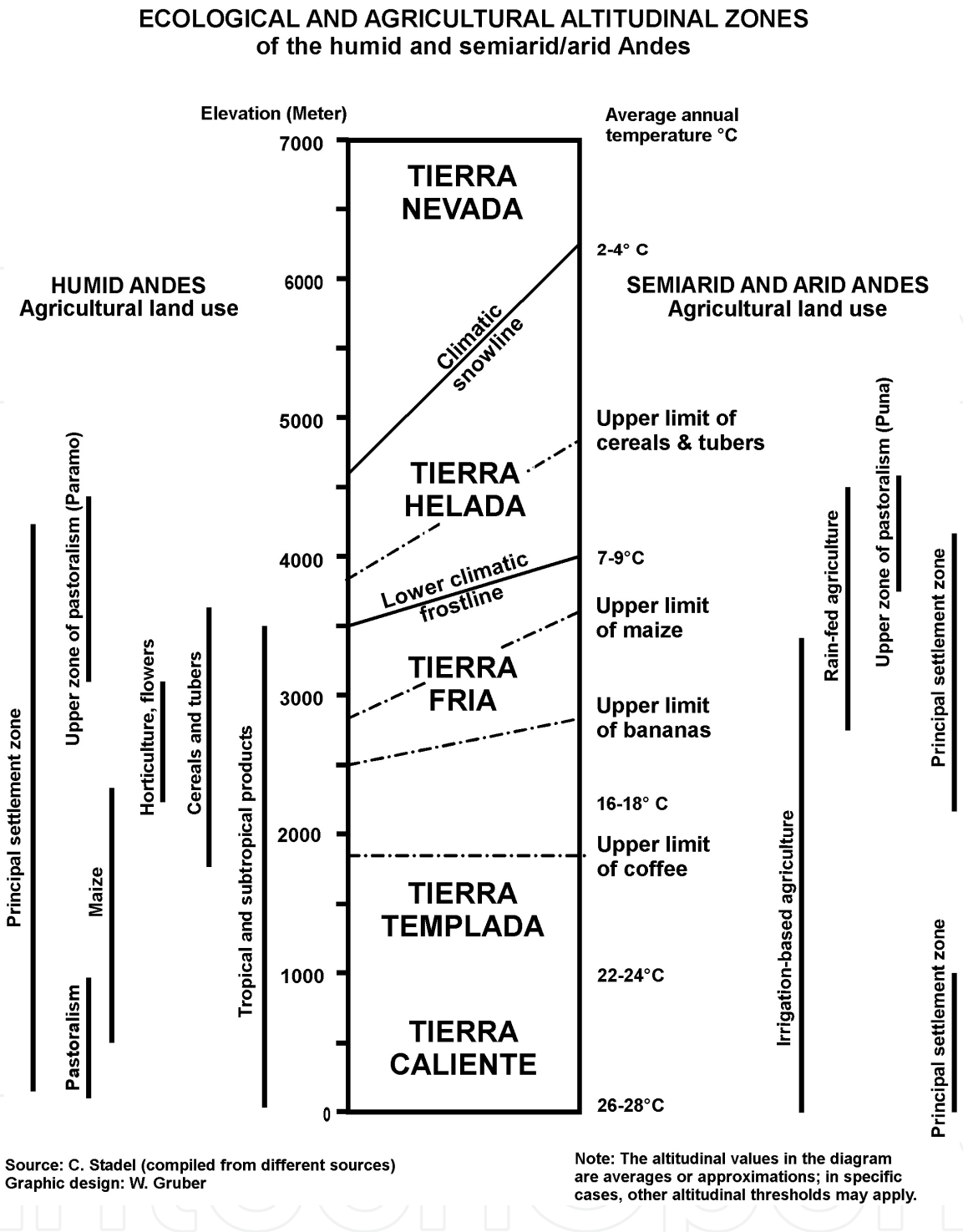


Figure 1.
Altitudinal zonation of ecology and agricultural land use in the tropical Andes (Stadel 1989).

them accessibility, transportation and intensified lowland-highland interactions, have influenced and modified human activities in mountains. In his rural research in Ecuador, Peru and Bolivia, the author [17–20] identified a vast array of factors influencing agricultural activities and rural land use:

- Altitude and relief configuration, erosion and sedimentation.
- Distance, proximity or remoteness to service centres and core areas.
- Climate, vegetation and soils.
- Natural hazards.

- Conservation measures.
- Access to and distribution of water: precipitation regimes, water rights and irrigation schemes.
- Cultural and spiritual traditions and local perceptions and practices.
- Age and nature of settlement process.
- Population parameters: age and gender structures and mobility and migration.
- Land tenure, land ownership, water rights and land reforms.
- Access to acceptance of innovation, modernization and new technologies.
- “Conscientization” levels, education and training.
- Local, regional, national and global market conditions.
- Alternative economic activities and employment opportunities.
- Access to capital and investment opportunities.
- Transportation and communication and social infrastructures.
- Local leadership and community initiatives.
- Exogenous impact of business ventures, governmental programmes, non-governmental intervention and influences of “expatriates” (e.g. remittances, investments).

2. Horizontal and vertical agricultural and rural spaces in the tropical Andes

For a long time, agriculture has been the backbone of the rural economy and employment and has been the basis for ancient civilizations in the tropical Andes. Andean agriculture is characterized by a great variety of production systems, land-use forms, types of cultivated plants and domestic animals and forms of pastoralism. Due to the constraints of altitude, slope, climate, soil, forest cover in humid parts and barriers of difficult accessibility, only a limited part of the Andean realm is suitable for agriculture. The agricultural core areas are situated in the larger longitudinal and transverse valleys (e.g. the valleys of the Magdalena and Cauca rivers in Colombia; the Patate-Pastaza rivers in Ecuador; the Marañón, Santa Marta and Mantaro rivers in Peru; the Rio Grande in Bolivia; the Central Valley in Chile; as well as the river oases of the semiarid and arid of the Pacific realm in Peru and northern Chile). Other favored agricultural regions are the highland basins (e.g. in the Sabana of Bogotá), the *cuencas* or *hoyas* in Ecuador and the wide *Altiplano* in southern Peru and Bolivia, especially the shores of Lake Titicaca with their favorable microclimate. In addition, the inner flanks of the *Cordilleras* in the climatic zones of the *tierra templada* and *tierra fría* are intensively used agrarian regions. In contrast to the old settled and agriculturally used Andean realm, newer agrarian colonization zones and rural pioneer spaces have emerged at the eastern Cordilleran

flanks and valleys in Colombia, Ecuador, Peru and Bolivia. Nonagriculturally oriented core areas are the urban–rural continuum regions of the major cities and metropolises, as well as the larger mining zones and manufacturing districts. Furthermore, population concentrations have developed along major transportation corridors and around principal ports and airports (**Figure 2**).

Andean agriculture is characterized by a pronounced altitudinal zonation, a result of thermic, hygric and edaphic differentiation. Following the classical altitudinal ecological “belts” from the warm lowlands to the cold highest parts of the ecumene, the *tierra caliente*, *tierra templada*, *tierra fría* and *tierra helada*, Borsdorf and Stadel [21] distinguish the following major agrarian zones:

1. Tropical lowland rain-fed farming (*Campo de Lluvia*) in the *tierra caliente* (from sea level to about 1000 m in the humid Andes)
2. Tropical lowland irrigation farming (*Campo de Riego*) in the *tierra caliente* in the semiarid and arid realm
3. Extratropical agrarian foothill zones (foremost the Chilean longitudinal valley and the foothill regions in northwestern Argentina)



Figure 2.
Chimborazo region, Ecuador (Photo credit: Stadel).

4. Agrarian areas of the tropical Andes in the altitudinal zones of the *tierra templada* and *tierra fría* (about 1000 to 4000 m)
5. Upper zones of field cultivation and pastoralism in the *tierra helada* (approximately 4000 to nearly 5000 m)

It is evident that water supply, water rights, water use and the management of the water resources are crucial for agriculture and rural sustainable livelihoods. Permanent, periodic or seasonal water scarcity and the high demand and diverse use of Andean water resources by a variety of decision-makers and often conflicting interest groups make water a critical ecological, cultural, economic, social and political issue and challenge. For instance, the excessive water consumption of the irrigated plantations of export-oriented river oases of coastal Peru threatens the water supplies for small-scale farming and rural communities in the upper watersheds. A voracious consumer of water is the powerful mining sector with its dramatic impact on the natural environment, the ensuing critical shortage and the contamination of water in the surrounding rural areas and the landscape degradation. More recently, the water demands in major tourist destinations (e.g. the Cordillera Blanca region, Cuzco and the *Valle Sagrado* in Peru) may conflict with the interests of farmers and rural residents in these areas. Conflicts may also arise in the use of water between the upper and lower parts of watersheds, between *indígenas* and non-native regions, between *latifundistas* and *minifundistas* and between urban and rural areas.

In a detailed study of a landscape profile of the Ecuadorian Sierra, Stadel [17, 18] investigated the complex ecological, agricultural and rural mosaic from the upper limit of agricultural activities and settlement at the foot of Chimborazo (about 4200 m) through the high mountain basin (*Cuenca*) of the city of Ambato and the Patate and Pastaza valleys to the foothills of the Eastern Cordillera (about 900 m). Along this altitudinal profile, the following land-use zones can be identified (**Figure 3**):

1. The sparsely settled pasture regions of the cool humid *páramo* at the upper limit of sporadic settlement and patchy niche field cultivation 3200 to 4200 m). The mostly indigenous population suffers from climatic stress and poor access to the market centres of Ambato and Guaranda; however, the *indígenas* control a large part of the regional water resources.

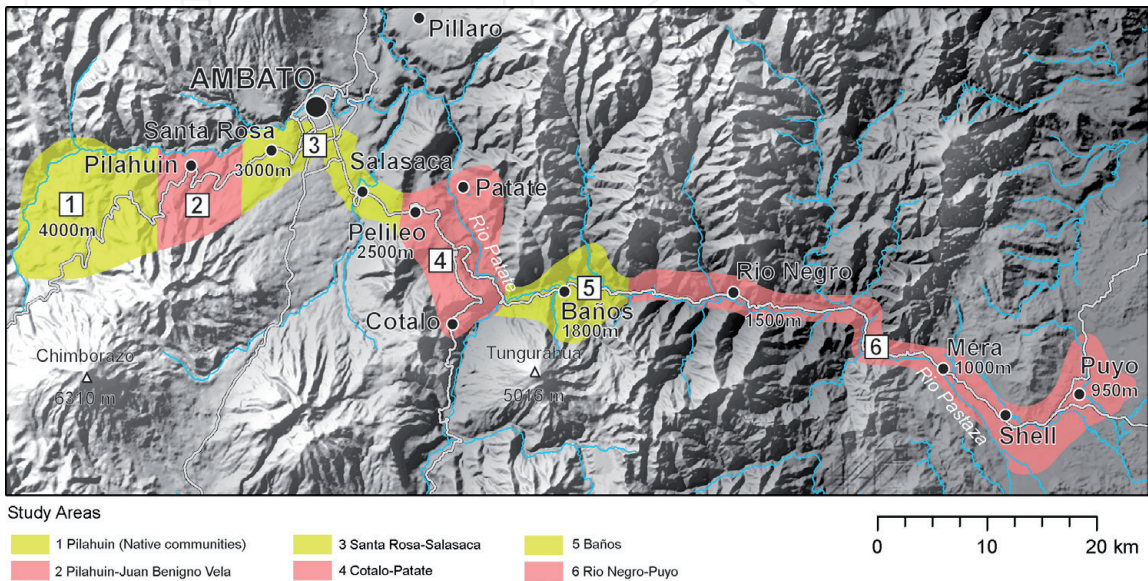


Figure 3.
Study region Chimborazo – Puyo, Ecuador (Stadel 1989).

2. The upper zone of intensive arable farming (2800 to 3200 m). A vast array of crops is cultivated, mostly in seasonal or annual rotation. In the lower parts, precipitations tend to be insufficient and unreliable, and irrigation becomes necessary.
3. The high mountain basin (*Cuenca*) of Ambato, including the adjoining inner Cordilleran slopes (2500 to 2800 m), a mixed urban–rural space. Rural population clusters are located around the dynamic regional market centre of Ambato and are specializing in productive fruit and vegetable growing and also rely on job opportunities in the city. The climate is semiarid, and agriculture depends on irrigation. In the southeastern part, the small enclave of the Salasaca native community gives the cultural landscape a distinct identity.
4. The agricultural core region along the Patate valley and a major highway corridor to the *Oriente*, the gateway to the Amazon lowlands (2000 to 2800 m). In the deeply entrenched valley floor, a highly productive irrigation-based *hacienda*—and *minifundio*—agriculture contrasts with a mixture of irrigated and nonirrigated small fields. Here, a mixture of vegetables, cereals and fodder crops is grown in a variety of traditional rotation cycles on steep slopes. Above about 2600 m, the irrigation-based agriculture gives way to a mostly seasonal and rain-fed agriculture. The urban centre of Pelileo, located on the major highway to Ambato and the *Oriente*, is the principal market centre of the region and a new centre of textile manufacturing, especially a production of jeans for national and international markets.
5. The temperate humid part of the Pastaza valley (1200 to 2000 m). This section is located in the ecological zone of the *tierra templada* and benefits from the rains which reach this valley from the Amazon lowlands. In the narrow valley floor and lower slopes, a variety of subtropical and tropical fruits and vegetables are grown. In the higher reaches, a mixture of different crops of a temperate, cooler climate. As one proceeds further downstream, the steep slopes are increasingly covered with a dense humid montane forest. The centre of this section is Baños, a regional service centre, a popular site for Ecuadorians and also foreign visitors, as a pilgrimage site and a recreational destination because of its mild climate and thermal waters.
6. The lowest part of the landscape profile, located in the *tierra templada* and higher parts of the *tierra caliente* (900 to 1200 m). This is a permanently warm and very humid zone, characterized by recent colonization agriculture, and a dispersed linear pioneer settlement stretching along the highway. Here, a wide selection of tropical crops is grown in the valley and on patchy forest clearings on the mountain slopes. At the exit of the Pastaza from the Cordillera, the city of Puyo is the booming regional multifunctional centre.

Zimmerer [22] has pointed out that “overlapping patchworks of farm special units are characteristic of the mountain landscapes of Andean regions of Peru and Bolivia. Patchiness and overlap...are shaped by the broad tolerances of major crops, high variability/low predictability of habitat factors, multifaceted cropping rationales of cultivators including their linkages to extraregional influences, and, to varying extents, the sociospatial coordination of crop choice among farmers”. Zimmerer arrived at this conclusion from detailed field studies within the two communities of Pampa Churigua (farmland range 2800 to 3450 m) in the Department

of Cochabamba, Bolivia, and of Mollamarca (farmland range 3100 to 4100 m) in the Cuzco Department of Peru. Although a maize/cereal zone of the lower slopes can be distinguished from an upper potato/tuber zone), a considerable mixing of a variety of crops, a patchiness of land parcels and an elevation-related overlap of crop types can be observed. In another contribution, Zimmerer [23]) states that “integrating the conservation of biodiversity by smallholder farmers with agricultural intensification is increasingly recognized as a leading priority of sustainability and food security amid global environmental and socioeconomic change”. This will contribute to an in situ conservation of agrobiodiversity and enhance the smallholders’ resilience.

The traditional pattern of agricultural land use has been profoundly altered in some areas by the locational influences of accessibility to highway arteries and regional market centres (**Figure 4**). Where topography, soil quality and irrigation potential exist, a specialized cultivation of vegetables, fruit and flowers serves the urban market, in some cases even international markets (e.g. the plantation of cut flowers for global markets in the *Sabana de Bogotá*) (**Figure 5**). Other agricultural cores of a specialized, export-oriented agriculture have developed because of an early valorization of favorable ecological conditions (e.g. the coffee-growing zones of the *tierra templada* in Colombia), or they have been the result of modernization, new technologies and entrepreneurial initiatives (e.g. the cultivation of special vegetables such as asparagus for world markets in the river oases of coastal Peru). Other important specialized agricultural zones are the wine-growing areas of the Central Valley of Chile and of the Cuyo region of Argentina or the legal or illegal plantation of coca bushes on the humid eastern side of the Andes in Bolivia, Peru and Colombia. New consumer demands may also entail a specialization of agricultural strategies. Examples for this are the new

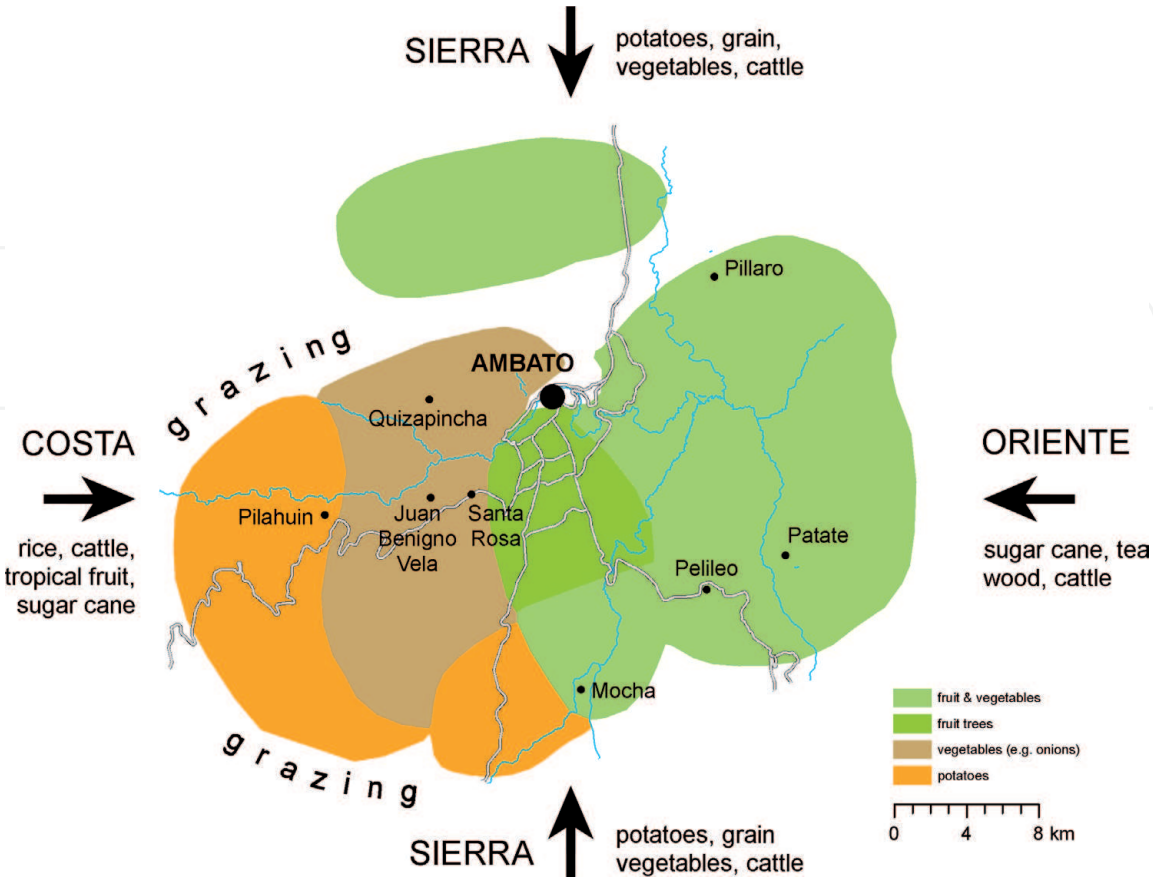


Figure 4.
Ambato market centre and agricultural hinterland, Ecuador (Borsdorf and Stadel 2015).



Figure 5.
Greenhouses of commercial flower cultivation, Sabana of Bogotá, Colombia (Photo credit: Stadel).

quinoa monocultures in the Lake Titicaca region or expanding alpaca breeding on the Bolivian *Altiplano*. While this specialization may bring enhanced economic benefits to the region, the potentially negative impact on the ecology, regional water resources, land tenure, traditional land use practices and potentially higher farming risks cannot be ignored [19].

3. Peri-urban clusters

Metropolitan centres and other important regional capital centres and economic centres have experienced major population growth rates and areal expansions. This has resulted in a massive planned or uncontrolled urban–rural interface of a wider surrounding region and to the emergence of major peri-urban clusters ([21]: 184-188 and 191-192). While this urbanization may bring to the region new housing, attractive landscape amenity sites for affluent urbanites (so-called *parcelas de agrado* and *ciudades valladas*, **Figure 6**), new employment opportunities or enhanced infrastructures, the negative impacts of this “urban invasion” often prevail ([24]: 239). Land speculation and soaring land prices are threatening the survival of small-scale agriculture and the traditional rural livelihoods by a consumption of often fertile irrigated agricultural land and by diverting the water resources from irrigating the fields to a use for urban households and commercial needs. Driven away by this urbanization process, agricultural smallholders are faced with the options of incorporating themselves into the urban agglomeration, to intensifying land use on their remaining plots or to seeking alternative new agricultural areas. Haller [24] has found that farmers in the Huancayo basin have expanded or intensified field cultivation in the higher *suní* [25] altitudinal belt (3500 to 4000 m), a marginal and poorly accessible agricultural zone with steep and nonirrigated slopes not suitable for year-round cultivation. Using the example of the regional city of Huancayo and the lower Shullcas Valley, Haller and Córdova-Aguilar [26] have demonstrated that urbanization puts pressure on agrarian land use, endangers the environmental integrity of the region and impacts the Huaytapallana Regional Conservation Area.

In the Andes, these agglomerations of a dynamic and multifunctional urban–rural continuum represent the most important areas of population growth, land use

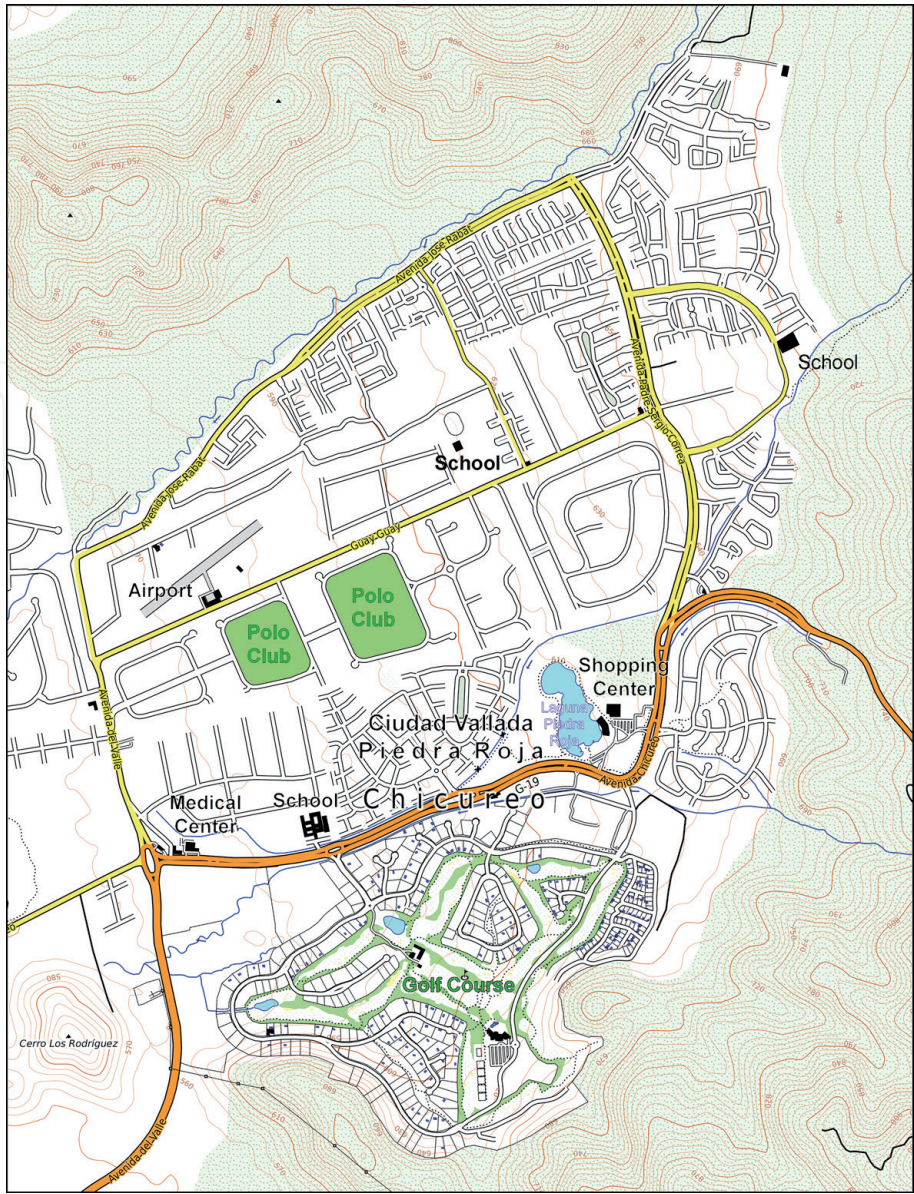


Figure 6.
Ciudad Vallada Piedra Roja, Chile (Borsdorf and Stadel 2015).

conversion and excessive densities of buildings and infrastructural developments. These newly emerging or rapidly expanding clusters are facing the challenge of integrated and effective regional planning and policy actions that attempt to regulate the nature of the growth processes, to recognize the interests of urban and rural stakeholders and to harmonize economic goals with ecosystem services.

4. Mining clusters

Since early times, mining has played a major role in the economic development of the Andes. With the discovery of rich deposits of the precious ores of gold and silver, mining has resulted in the establishment of working camps and subsequently in the foundation of smaller and larger settlements. The most famous of them were the silver-mining city of Potosí (**Figure 7**) in current Bolivia and the mercury-producing city of Huancavelica in the Peruvian Sierra. Both of these booming centres of the early colonial mining industry are located at high altitudes, Potosí at close to 4100 m and Huancavelica at 3600 m. After the initial and generally short-lived



Figure 7.
Potosí, Bolivia (Photo credit: Stadel).

gold- and silver-mining boom, other mineral deposits became important: copper, tin, zinc, lead, iron ore, salpetre and most recently lithium.

Unlike farming and agricultural settlements, the development of mining settlements was not related to favorable environmental factors; many mining sites emerged in locations normally considered unfit for settlements: copper mining in the arid Atacama desert and the mining of gold and a range of non-precious ores at high elevations, some of them above the limit of the ecumene of farming and pastoralism. The most striking example for this is La Rinconada in the southern Peruvian Andes, a gold-mining boom town at 5100 m with an estimated population of some 40,000 people. In addition, many mining clusters developed in areas of poor accessibility and the building of adequate transportation lines represented a major challenge. While the development of these mining areas largely superseded environmental constraints, mining and the associated smelting activities had entailed a corollary of environmental impacts, not only for the mining settlements proper but also for a larger surrounding region, e.g. the excessive consumption of regional water resources, deforestation, severe erosion, mass wasting processes and water and air pollution.

While mining may offer to the regional population often a much needed alternative employment, encourage the development of infrastructures and services and have stimulated regional economies, the mining sector for a long time has been controlled and dominated by outside national and foreign stakeholders who had little interest in a sustainable regional development. Bury [27] portrayed the negative repercussions of mining on traditional land tenure, water rights, agricultural land use and community institutions. Furthermore, the fate of mining tends to be fluid and uncertain, with many mining areas affected by the typical “boom and bust cycles” resulting from an exhaustion of ores or sharply declining global market prices.

5. Rural tourism nodes

“The exceptional diversity of landscapes and cultures in the Andes holds rich opportunities for tourism” ([21]: 249). The ecological variety in the tropical and

extratropical realm of the Andes ranges from the humid rainforests (*selva*) and cloud forests (*Ceja de la Montaña*) to various types of highland grasslands, to thorn steppes, salt pans (*salares*) and deserts. On the highest summits in the tropics and on lower elevations in the extratropical realm, snow- and icefields cover the mountains. In addition to this extraordinary ecological diversity, the impressive mountain scenery of rugged peaks (most famous of them are the Torres del Paine in Chilean Patagonia or the spectacular, glacier-covered Cordillera Blanca in Peru) of the numerous active and dormant volcanoes; the deeply entrenched valleys (e.g. the Colca Canyon in Peru); the impressive fjord coast of southern Peru, the impressive rivers in the eastern Cordilleras; the mountain lakes, foremost Lake Titicaca; or the vastness of the Peruvian and Bolivian *Altiplano*, the landscape appeal of the Andes is further complemented by the rich cultural heritage of the region. Among the famous visitor attractions are the pre-Inca sites (e.g. Chan Chan in the coastal desert of Peru; Chavín de Huantar in the eastern Cordilleras of Peru; Tiahuanaco on the Bolivian Altiplano); the impressive monuments and other relics of the material culture of the Incas centred in Cuzco, Machu Picchu (**Figure 8**), and other sites of the *Valle Sagrado*. With the Spanish conquest, the Inca culture was superseded and replaced by the Spanish cultural heritage. Visitors are attracted to the colonial towns with their churches, monasteries, museums, *plazas* and typical colonial houses, to attractive *hacienda* buildings (many of them converted to elegant hotels) and to



Figure 8.
Machu Picchu, Peru (Photo credit: Borsdorf and Stadel).

pilgrimage sites. Many of the pre-Spanish and colonial cities have been included in the UNESCO World Cultural Heritage list, a fact which further enhances their appeal for tourists. In a generalized model, Borsdorf and Stadel [21] have portrayed the altitudinal zonation in major types of Andean tourism in the tropical and extratropical realm (**Figure 9**).

In addition to the most common type of a sightseeing tourism attracted to the most famous sites, other forms of visiting and tourism can be observed. Ecotourism has been promoted at all altitudinal levels in many ecologically attractive niches. Of particular interest to visitors are the National Parks, the Biosphere Reserves and other types of protected areas. Still rather spotty are various forms of rural or agrotourism, but this type of tourism may still face the barriers of difficult accessibility, substandard accommodation and other facilities, insufficient investment funds and promotion and sometimes also hesitant rural host families and communities. Successful examples are the *comunidades* of Vicos and Humacchuco in the Cordillera Blanca region of Peru, to the north of the major mountain tourist centre of Huaraz [28]. With the support of the *Instituto de Montañas* in Huaraz, the local population was involved in various ways in a gentle, ecologically and culturally compatible and sustainable rural tourism.

Under the motto “cuidar la vida en las montañas” (protecting life in the mountains), some communities around the Huascaran National Park (founded in 1975) benefit from this initiative and are participating in all stages of the planning and management of rural tourism. Ecotourism and “soft” agrotourism are contrasting with newer forms of sports, adventure or event tourism (e.g. mountain biking, paragliding, white-water rafting, modern festivals). Mountaineering, here called *andinismo*, has a long tradition and appeals to a national and international clientele. Preferred destinations are the high Cordilleras, notably the Cordillera Blanca and Cordillera de Huaylas of Peru, the Cordillera Real in Bolivia and the Patagonian Cordillera of Argentina and Chile.

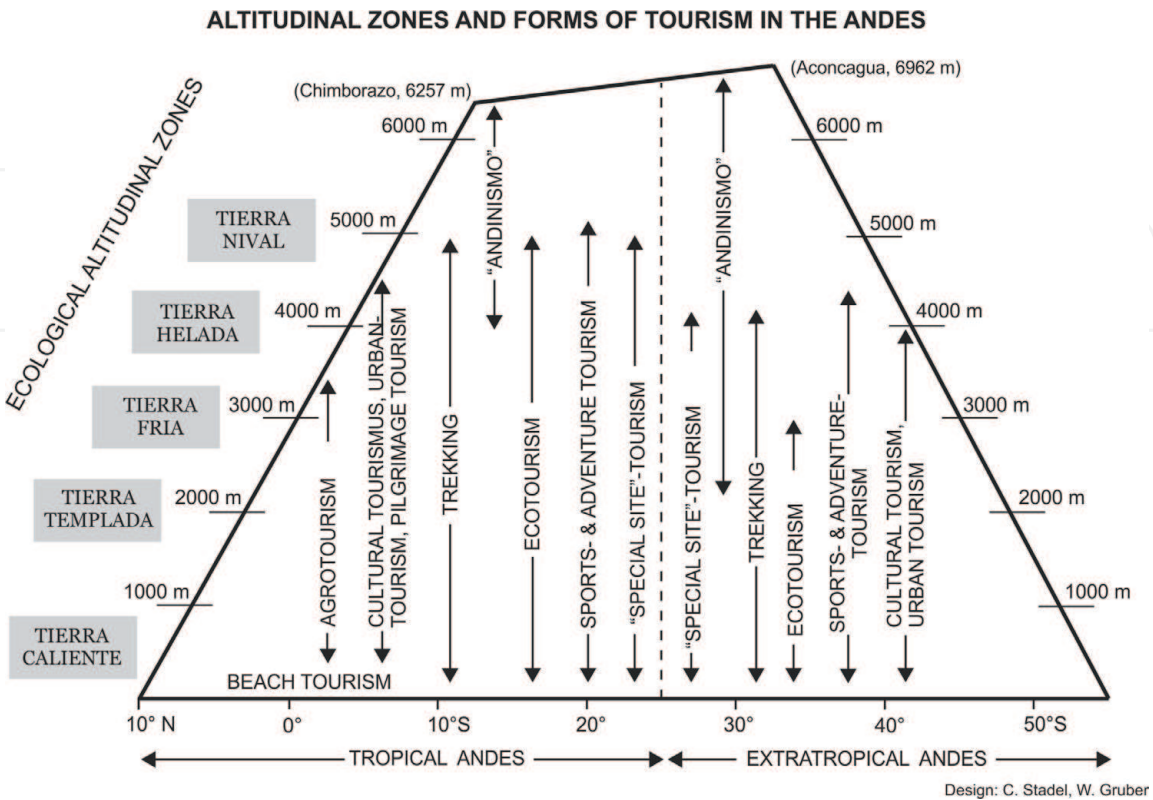


Figure 9.
Altitudinal zones and forms of Andean tourism (Borsdorf and Stadel 2015).

6. Rural spaces: development scenarios and options

With progressive urbanization, rural spaces have lost some of their former demographic weight and economic importance. Nevertheless, rural populations continue to represent a large share of the tropical Andean states, and the rural realm forms an important part of national identities and cultures. Economically, many areas can still be rated as marginal spaces, but many regions are important as diversified agrarian areas, as water reservoirs, as mining sites, as destinations for urban amenity migrants and tourists and most important as livelihoods for people. Some rural core areas have become new growth poles and arenas for development and modernization; other regions, in particular the poorly accessible and resource-deficient areas, are threatened by natural hazards, by poverty, stagnation and marginalization, aggravated by political, economic and social neglect and discrimination. External influences and impulses pervade the entire rural realm, even the remote areas. Today, electronic information and communication media bring rural people in touch with national and global developments. In addition, temporary or permanent out-migrants furnish their home community external information, in many cases also remittance cash flows or investments. This has a significant economic, social and cultural impact on their former home communities. Further external actors are government agencies, an array of non-governmental organizations, international institutions and powerful corporations and companies. The consequence of these impacts are significant “livelihood transitions” and “place transformations” [29] which may even transform some Andean core regions into globalized spaces [30].

The result of these multiple endogenous and exogenous influences may have positive or negative impacts on rural communities and livelihoods:

In some of the more accessible areas, technological innovations and market developments have stimulated agricultural developments and changes in crop patterns, leading to serious consequences for exchange relationships and trade between zones. In other zones, people have diversified their livelihood through non-agrarian activities (crafts, wage labour, etc.) or have migrated. ([31]:3).

Yarnall and Price [32] have examined the impacts of migration and remittance flows on communities in the Valle Alto of the Department of Cochabamba in Bolivia. They observed a “new rurality” transforming the traditional rural environment and society. The communities have benefited by being linked to new “diaspora knowledge networks”, from increased material resources and new stimuli of development. Some formerly poor peasant communities have even become materially better off than nearby colonial towns. But at the same time, the remittance dependence has made these communities vulnerable; as for various reasons, these cash and investment flows may not be reliable and sustainable. Furthermore, traditional forms of agricultural activities and employment may be eroded, and emerging rather sharp economic and social disparities result in a fragmentation of the rural realm.

It follows that rural development is complex, highly differentiated and at times also controversial. A generally accepted approach is to harmonize environmental, sociocultural and economic goals. Bebbington [33] views rural development neither solely rooted in conventional cultural values, economic pursuits and social structures and to the persistence of a subsistence-based economy nor in an uncritical opening to external influences, modernization, new technologies and an unrestricted adherence to national and global market processes. An array of development interventions are directed toward an attenuation of natural risks and their impacts, a protection of natural resources and a preservation of the genetic pool of biodiversity. But these efforts can only have a long-term success if the livelihoods of rural communities

and the basic needs of the local population are secured or enhanced in a sustainable fashion [34]. Furthermore, it is today generally recognized that local and regional cultural aspects should be the fundamental basis in the development discourse ([21]: 311). In the past, rural economic development was often guided by external views and strategies without considering the “meaning that campesinos impart to the economy as actors in a social context” ([35], Abstract, 310). Rist therefore pleads for an “actor-oriented approach that is not based on preconceived, nonlocal concepts” (ibid.). This has been referred to as “ethno-development” [36], “development with identity” [37], “participatory cultural development” and other terms. Andolina et al. [38] call this approach “alternative modernities” enabling and mobilizing local human resources and strengthening local ownership and responsibility [39]. Local cultures and the traditional heritage are no longer seen as obstacles and barriers to development, but as enriching, locally accepted and sustainable factors. Local knowledge and practices should not be seen as static and paralyzing, but as dynamic and evolving: “transformed by autochthonous innovations, by an adaptation to changing circumstances, and by an adoption of knowledge, capabilities and technologies” ([40]: 14, translated).

Based on his empirical research in the tropical Andes, Stadel [20] derived the following postulates for a “*campesino*-oriented development”:

- Appreciation of the knowledge and experience of *campesinos* (*saber campesino*) and strengthening of their cultural pride.
- Esteem for the traditions, cultural values, customs and rituals of local communities (*lo andino*, [41]; *sagesse des Andes*, [42]).
- Strengthening of communal solidarity and cooperation.
- Respect for nature (*cosmovisión andina*) and an aspiration to harmonize environment and society.
- Exploration of the potentials and limitations of the natural and human environments.
- Strengthening of the resilience and adaptive capacities of the local population, facing environmental risks, economic and social vulnerabilities and potential disaster.
- Improvement of the living conditions of the population, with a special focus on poor people and enhancement of the infrastructures and services in water supply, sanitation, health, nutrition and housing.
- Promotion of environmentally compatible and sustainable forms of agriculture (*agroecología*) and silviculture and of agricultural niche products.
- Enhancement and diversification of alternative income and employment opportunities (e.g. in eco- or agrotourism).
- Mobilization of local human resources and creation of attractive local perspectives for young people to stem their migration to cities.
- Improved access to microloans and other forms of financial and technical support.

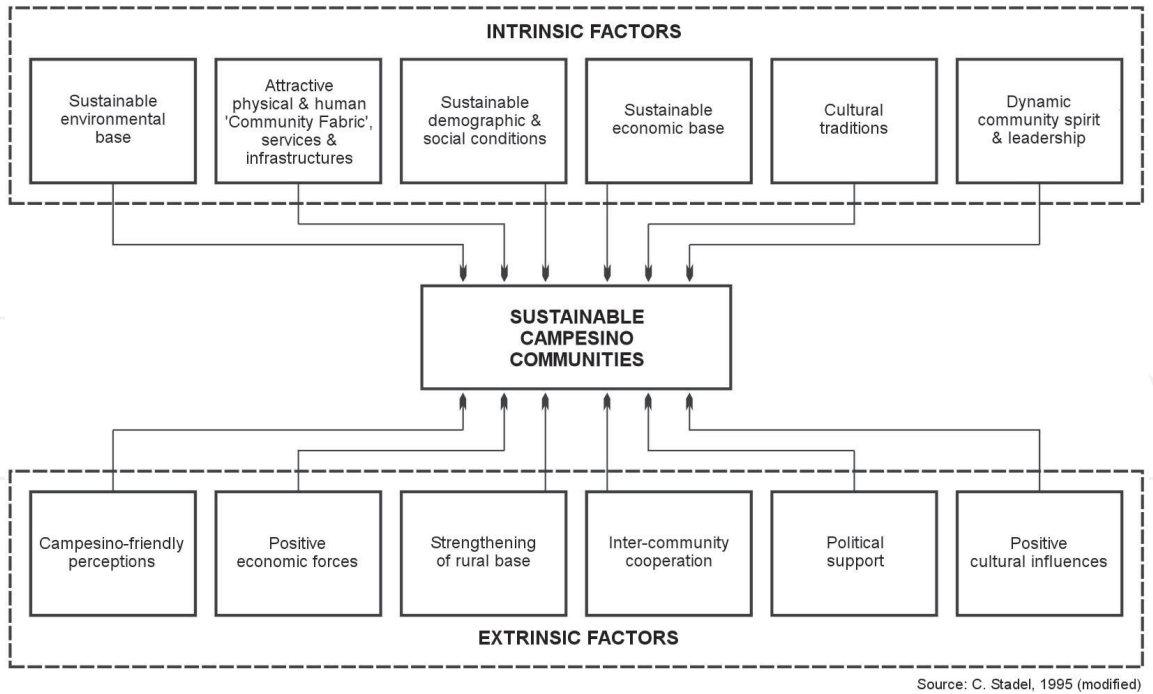


Figure 10.
Sustainable campesino communities – a conceptual model (Stadel 2008).

- Sensible use of external funds, especially of the remittances, to meaningful types of investment.
- Safeguards against economic, social and political discrimination and exclusion and struggles against external exploitation.
- Development emphasis on locally perceived and formulated needs, priorities and implementation methods.
- Participation, enablement and empowerment in rural development and ownership of projects by local communities.
- Enhanced communication channels, accessibility and transport facilities.
- Improvement of the quantity and quality of formal and informal education and training.

In a simplified summarizing table (**Figure 10**), Stadel [20] has proposed a conceptual model for “sustainable *campesino* communities”. It is argued that *campesino* communities can benefit by various positive intrinsic factors, as well as by favorable extrinsic factors.

7. Conclusion

In spite of rapidly expanding metropolitan centres and a progressing urbanization, the identity of the Andean realm is still rooted in agricultural traditions and in rural societies. Based on the mountainous character but also because of the opportunities for rural living, the Andes can be portrayed as a rich and varied mosaic of agricultural fields, pastures, farms, villages and towns, forming archipelagos of favorable environmental conditions, of human activities, and of cultural heritages.

The diversity of rural spaces is the result of the extraordinary variety of natural and cultural traits, both in the horizontal and vertical dimensions of the Andes. In the horizontal perspective, agricultural land use in the tropical regions is distinguished from that of the extratropical one and is also differentiated by climatic influences from the Pacific Ocean or from the continental basins of the Amazon and Orinoco watersheds. Distinct agricultural patterns and rural landscapes are further resulting from the human factors of accessibility to roads and markets, cultural traditions, as well as external impacts.

While the core and most widespread functional identity of the Andes lies in farming, pastoralism and agricultural settlements, the rural space is also shaped by other activities, foremost mining, industry and commercial activities. More recently, urban real-estate interests have “invaded” selected regions outside larger cities, especially in areas with a specific landscape or climatic appeal. Urban “amenity migrants” have moved into secluded peri-urban clusters, often into “gated communities” (*ciudades valladas*). Another newer form of rural functional orientation is the recreational appeal and the national and international tourism potential in attractive landscapes and cultural sites. Therefore, the extraordinary complexity of micro-spatial rural clusters has generated an intricate pattern of diverse “archipelagos” in the Andes.

The rural Andes are a dynamic realm undergoing many changes and deep transformations. This applies to agriculture with its adaptation to changing environmental conditions, to new market orientations and in some cases to altered perceptions and strategies of farmers. Rural regions, even in formerly remote locations, are no longer isolated areas; in some cases, they may also no longer be regarded as peripheral spaces. New transportation arteries and communication channels connect rural residents to national core areas, even to global regions and actors. But the changes in the rural realm have not eliminated its disparities, and the “new rurality” has old and new winners and losers. Some regions are stagnating, and some rural people remain poor or are becoming marginalized, while others are dynamic, with its stakeholders progressing and seizing new opportunities.

The viability of the rural Andes is endangered by a number of internal and external threats. The vagaries of the climate and environmental deterioration processes are threatening agriculturally based livelihoods, especially those of small farmers. The persistent imbalance in the land tenure system, rural unemployment and underemployment, poverty and deficient infrastructures and services, combined with the lure of cities and other countries, have depleted many rural regions of the human capital of young and enterprising people. Furthermore, the growing external control of the land and its natural resources by external interests and stakeholders threaten the livelihoods of the rural population.

What are the options for a sustainable future of the rural Andes? Generally speaking, the rural realm must be effectively assisted to overcome inequality, discrimination, poverty and marginality and thus become an attractive living space and an alternative to the life in large cities or overseas. Rural population should be empowered to control and mobilize their resources and to develop mechanisms for enhanced local autonomy and self-determination. The author has proposed a generalized conceptual model for “sustainable *campesino* communities”. But every region and community has its own identity, needs and priorities and will undoubtedly find their ways to enable them to seek appropriate development paths, likely in a careful balance between proven environmentally and culturally adapted strategies and new ones, innovative but also sensitive to the environment, societies and cultures of the region: “The pursuit of sustainability is a local undertaking not only because each community is ecologically and culturally unique but also its citizens have specific place-based needs and requirements” ([37]: 1).

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Author details

Christoph Stadel
University of Salzburg, Austria

*Address all correspondence to: christoph.stadel@sbg.ac.at

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