



HAL
open science

Growth of market gardening for local sales in the Mount Everest tourist region of Pharak, Nepal Electronic reference

Céline Abadia, Olivia Aubriot, Joëlle Smadja, Michel Vaillant, Marc Oswald

► To cite this version:

Céline Abadia, Olivia Aubriot, Joëlle Smadja, Michel Vaillant, Marc Oswald. Growth of market gardening for local sales in the Mount Everest tourist region of Pharak, Nepal Electronic reference. *Revue de Géographie Alpine / Journal of Alpine Research*, 2019, Small Farmers in Mountainous and Forested Hinterlands, 107-3, 10.4000/rga.6402 . halshs-02933616

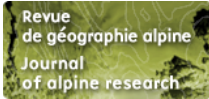
HAL Id: halshs-02933616

<https://shs.hal.science/halshs-02933616v1>

Submitted on 8 Sep 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Journal of Alpine Research | Revue de géographie alpine

107-3 | 2019

Les petites paysanneries des arrière-pays montagneux et forestiers

Growth of market gardening for local sales in the Mount Everest tourist region of Pharak, Nepal

Abadia Céline, Aubriot Olivia, Smadja Joëlle, Vaillant Michel and Oswald Marc



Electronic version

URL: <http://journals.openedition.org/rga/6402>

DOI: 10.4000/rga.6402

ISSN: 1760-7426

Publisher:

Association pour la diffusion de la recherche alpine, UGA Éditions/Université Grenoble Alpes

Brought to you by Campus Condorcet



Electronic reference

Abadia Céline, Aubriot Olivia, Smadja Joëlle, Vaillant Michel and Oswald Marc, « Growth of market gardening for local sales in the Mount Everest tourist region of Pharak, Nepal », *Journal of Alpine Research | Revue de géographie alpine* [Online], 107-3 | 2019, Online since 13 December 2019, connection on 08 September 2020. URL : <http://journals.openedition.org/rga/6402> ; DOI : <https://doi.org/10.4000/rga.6402>

This text was automatically generated on 8 September 2020.



La Revue de Géographie Alpine est mise à disposition selon les termes de la licence Creative Commons Attribution - Pas d'Utilisation Commerciale - Pas de Modification 4.0 International.

Growth of market gardening for local sales in the Mount Everest tourist region of Pharak, Nepal

Abadia Céline, Aubriot Olivia, Smadja Joëlle, Vaillant Michel and Oswald Marc

AUTHOR'S NOTE

This study was carried out within the framework of the project ANR PRESHINE (ANR-13-SENV-0005) Pressures on Water and Soil Resources in the Nepalese Himalayas – (2014-2018).

Introduction

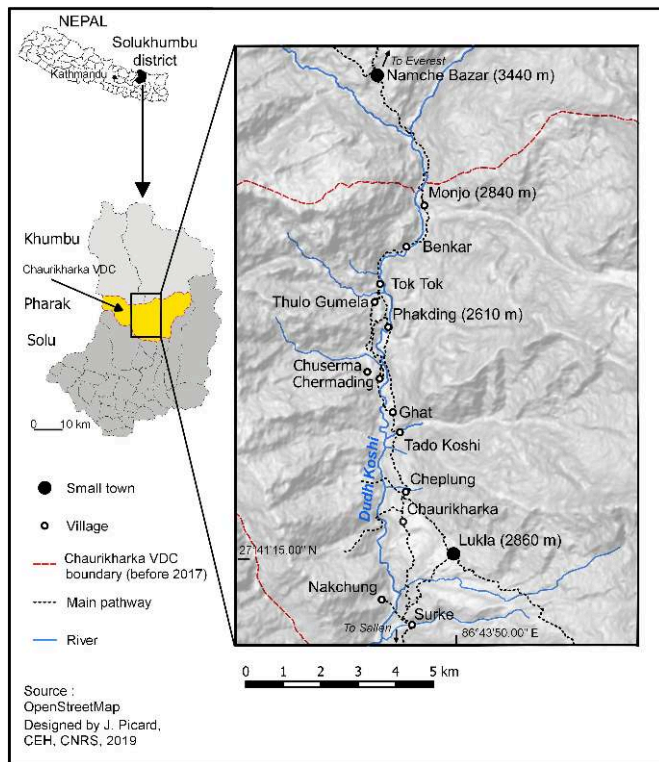
- 1 'The production systems of tropical highlands are undergoing profound transformations, often due to more intensive recourse to labour or investment. This is a global phenomenon,' wrote Tulet in 2009 (p.275) about market gardening. Like elsewhere in the world (Tulet, 2009; Charlery de la Masselière *et al.*, 2009; Cochet *et al.*, 2009), market gardening in Nepal is being subjected to one of these forms of intensification, developing in much the same way across the country, driven by urban growth and the expansion of the road network (Brown and Shrestha, 2000; Paudel, 2002; Duchet *et al.*, 2004; Adhikari, 2008; Shrestha *et al.*, 2016).
- 2 Yet in Pharak, an isolated Everest region that is of interest to us here, it is seasonal tourism that has contributed to the growth of market gardening since the 2000s. Since this region is far from the road network and urban markets, market gardening production here is not sold outside the area. It is supplied to a local market for tourists who arrive in March-April and October-November, giving this region a specific dynamism that contrasts with the situation of other high- and Nepalese high- and

middle-mountain regions. Indeed, over the last 60 years, these regions have experienced an agro-pastoral decline because of improved education of children since the 1960s, labour migration of men, the younger generation's lack of interest in agriculture, the proliferation of protected wildlife, etc. This has resulted in a shortage of labour, undermining mountain farming systems which, for the most part, rely on the availability of abundant labour (Aubriot *et al.*, 2012).

- 3 Pharak has partly escaped this negative spiral thanks to the tourist attractiveness of Khumbu in the north. Dominated by Mount Everest, this region has become a 'symbolic place' ('haut lieu' in French, Debarbieux, 1993) of mountain tourism starting in the 1970s (Sacareau, 1997) and every year it draws hikers eager to experience the panorama of the 'roof of the world' (more than 40,000 in 2017). The region's largely Sherpa population prefers to work in tourism-related jobs (lodges manager, mountain guide, etc.) rather than in agriculture, and chooses to employ labour from Solu (south of Pharak) to work in the fields. At the same time, tourism has generated a new demand for agricultural products and has led to a reconfiguration of agro-pastoral activities. The latter is therefore oriented towards production for tourist consumption (potatoes and other vegetables, Abadia, 2016), and fodder for pack animals that carry hikers' food and gear (Muller, 2016).
- 4 With greenhouse agriculture (encouraged during the decade 2000-2010) complementing in field farming, market gardening now occupies a significant place in the landscape.
- 5 Although market gardening in Pharak is part of a broader movement to develop this activity in Nepal, we show here how the form of 'seasonal urbanisation' induced by tourism provides favourable conditions for its local development, even where there is no urban demand or proximity to the road network.
- 6 To this end, after presenting 1) the study area and the methodology, we analyse 2) the changes in the agrarian system, 3) the history of the development of market gardening in Pharak, and 4) that of greenhouses, by considering the pluriactivity and the socio-economic profile of the families who own them. Finally we discuss 5) the seasonal aspect of production and tourism as well as the notable and defining characteristics of the short supply chain for perishable goods.

The study area and the methodology

- 7 Meaning 'in-between' in the Sherpa language, Pharak is located in Solukhumbu district between the middle mountains of Solu (with no glacier but with snow-capped peaks) and the high mountains of Khumbu (where there are glaciers) (Figure 1). It encompasses a portion of the Dudh Koshi River valley, which determines the valley's layout and organisation, with its tumultuous flow only being fordable at a few bridges. The valley's steep slopes only allow habitations at the very bottom (from 2,200 to 2,900 m above sea level).

Figure 1: Map of Nepal and location of Pharak¹

Source: Open Street Map. J. Picard, CEH, CNRS, 2019

- 8 The hiking trail that leads to Everest runs across the full length of Pharak, from Surke village in the south to Jorsalle village in the north. The majority of tourists and goods arrive in the region via Lukla village's altiport, perched at 2,850 m above sea level. Lukla is the main gateway to Pharak and the nerve centre of the valley's logistics. Namche Bazaar (at 3,500 m in altitude and the gateway to Khumbu) is the region's second economic centre and is also the town where tourists acclimatise to the high altitude. The social, agricultural and economic differences that exist between the different villages in Pharak are explained by their distances to these two hubs rather than by their somewhat similar altitudes. We thus distinguish Upper Pharak to the north, with its narrow deep gorges and Namche as its economic hub, from Lower Pharak to the south, with wider alluvial terraces and economic links with Lukla.
- 9 To carry out this study, we chose to use a qualitative approach inspired by the diagnostic analysis of agrarian systems (Cochet, 2011; Mazoyer and Roudart, 1997). This method makes it possible to 'systematically highlight and characterise the relationships that exist between the evolution of social relationships, the changes in techniques, and the successive transformations of ecosystems' (Dufumier, 1996:57). It helps to grasp the strategies implemented by the various categories of agrarian society and to understand the mechanisms of dissemination and adoption of agricultural innovations. The fieldwork phase – carried out from February to April and October to November in 2015² – began with a landscape analysis to identify the agroecological complexes in the study area and to identify the modes of development that led to the observed landscape. Eighty-four semi-structured interviews were then conducted among the population (i.e. about 1 in 10 households³) with the help of an interpreter in 12 Pharak villages. The purpose of these interviews was twofold: to apprehend the

agrarian transformations over the past few decades in the region under study and to understand how different families have gradually modified their activity systems (Gasselin *et al.*, 2014) in response to growth in tourism. Finally, to explore more closely the market gardening issue, a study of this sector completed the agricultural diagnosis to help understand how the sector works economically and socially, and how it is organised from spatio-temporal perspective. For this, 27 out of the 60 farmers practising greenhouse vegetable cultivation were interviewed.

A historically open agrarian system

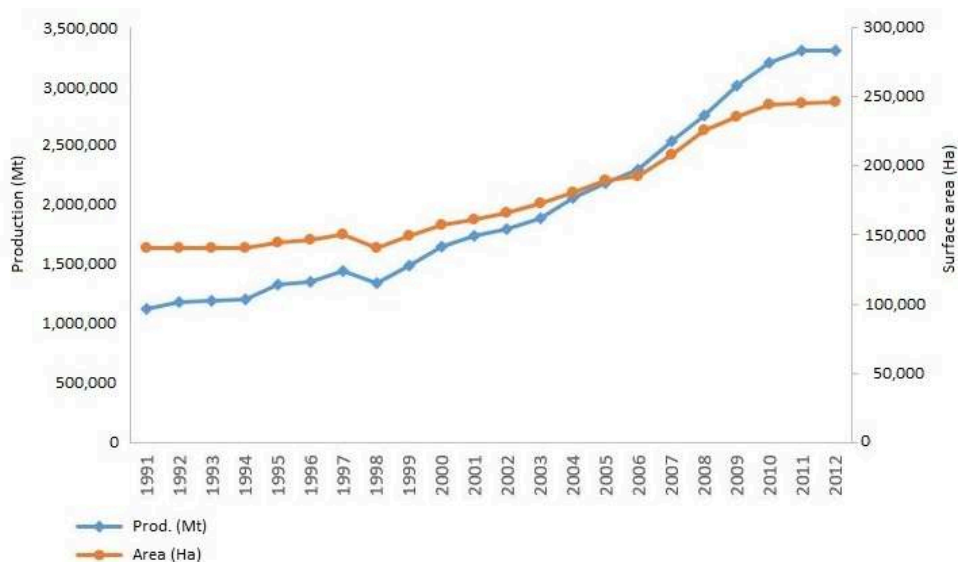
- 10 The Pharak region, inhabited mainly by the Sherpa ethnic group which arrived from Tibet in the 16th century (Oppitz, 1974), has historically been a livestock farming region, especially known for the breeding of *chauri*.⁴ At the beginning of the 20th century, each livestock farming family owned about 20 animals and processed the milk into cheese and butter, which they then sold in Solu where they bought cereals because their wheat and barley yields were low. The potato, introduced between 1840 and 1860 (Stevens, 1993; Dollfus *et al.*, 2009), improved the nutritional status of the population and generated marketable surpluses (Furer Haimendorf, 1964). As a result, crop rotations were modified in the 1920s: farmers gradually extended the surfaces devoted to potatoes to the detriment of the less profitable buckwheat. As for vegetables, only Tibetan radish and mustard were grown in Pharak in the early 20th century. Until the early 1950s Pharak's population thus relied on livestock farming (*chauri* and their milk production), on rainfed agriculture (potato, wheat, barley, buckwheat, and the two aforementioned vegetables) to a lesser extent and on trade with Tibet in the north and the valleys of Solu in the south, its central geographical position between these two areas giving it a role of a commercial intermediary.
- 11 The 1950s were marked by several political and economic changes. The country opened its borders to foreigners. This resulted in the first ascent of Mount Everest in 1953, which led to the beginning of the famed reputation of the Sherpa ethnic group in the field of Himalayan mountaineering (Sacareau, 1997). In 1957, the Nepalese government nationalised all of the country's forests (Ripert *et al.*, 2009) making it impossible in principle for farmers to clear forests to extend their plots. A major event in 1959, closure of the border by China, led to an abrupt halt to trade between Nepal and Tibet. Since the income from agriculture was not enough to support them, Sherpas were forced to find new markets to sell their animal products. During the 1960s, they reoriented their trade towards domestic markets and therefore exchanges with the valleys in the south intensified. This reorganisation was marked in particular by the arrival of rice which was exchanged for dairy products. To help the supply meet the demand, weekly agricultural markets were organised, such as in Namche Bazaar in 1965 (Stevens, 1993).
- 12 The construction of the altiport in Lukla in 1964 contributed to an increase in tourist traffic. Dozens of Western mountaineers, eager to be 'first', offered Sherpas substantial sums of money for the to accompany them on their expeditions. The strongest Sherpa men traded their farm pickaxes for mountain ice axes and gradually specialised in mountain tourism (porter, guide, cook, etc.). Despite the hardship these new jobs entailed, they soon proved to be much more profitable than livestock farming. Lacking time to undertake both activities, the Sherpas sold most of their animals in Solu.

Upland pastures were abandoned and pastures near houses were converted into plots. There was a decline in the breeding of *chauri* and much of the family labour force was reassigned to jobs in tourism. During the 20th century, the inhabitants of Pharak had to constantly adapt their activities to economic opportunities and political events, but their agrarian system always remained open, especially because of the numerous commercial relationships maintained with the outside world.

Development of market gardening in a context of a tourist boom

- 13 After Nepal opened to foreigners in 1950 and once it started receiving international aid, agriculture was made part of a planned development economy through a succession of five-year plans: several agronomic research stations were set up in the country and the Department of Horticulture was created in the 1960s (Bahadur Thapa *et al.*, 2017). A decade later, the government decided to promote market gardening as a way to reduce poverty in rural areas (Nepal Planning Commission, 1973; 1980). But it was not until the end of the 1990s that this form of agriculture saw any real progress (Figure 2), thanks to the 1995 'Agriculture Perspective Plan' which aimed, *inter alia*, at supporting the production of cash crops in irrigable areas located near road networks and with good market access. Lowland market gardeners in the south of the country and in the Kathmandu Valley benefited from subsidies for inputs and motorisation, and availability of credit (Shrestha, 2008). Market gardening thus developed, as in other parts of the world, in peri-urban areas or near road networks, to meet demand driven by growing urbanisation (Aubriot *et al.*, 2012, Thapa *et al.*, 2017), experiencing the most rapid post-1970 growth in South Asia (Muzzini *et al.*, 2013).

Figure 2: Vegetable acreages and production in Nepal from 1991 to 2012



Source: Agri-Business Promotion and Statistics Division, 2013

- 14 The development of market gardening in Pharak at high altitudes and away from road networks and cities therefore comes across as unusual. Until the 1980s, agriculture

here was little oriented towards tourism. In fact, mountaineering expeditions as well as hikers heading to Khumbu slept in tents and brought all their food from Kathmandu (Sherpa, 1985). They supplemented their provisions with products they bought in Lukla and Namche but which were transported to these markets from the capital. However, mountain tourism really took off in the 1980s: in 1972, 2,254 visitors came to Khumbu (Sacareau, 1997), this number rose to 20,000 in 1998 and doubled 20 years later (Sagarmatha National Park, 2017). Lodges began to develop (Nepal, 2005) and to offer catering, thus leading to an increased demand for agricultural products. The liberalisation of the aviation sector, starting in 1992, accelerated this process: the number of private airlines increased (World Bank, 2010) and tourist arrivals shot up as did the amount of freight transported to the region. Only lodges bought vegetables from Lukla and Namche markets because their price, inflated by the cost of air transport, made them unaffordable for the local population. At the same time, these transport facilities allowed the Sherpas to travel throughout Nepal and helped them bring back not only new techniques and knowledge, but also seeds. Market gardening spread across Pharak. By the end of the 1990s, a wide range of vegetables⁵ was being cultivated in individual vegetable gardens, helping to diversify the diet of the local population and providing access to products hitherto intended solely for tourists.

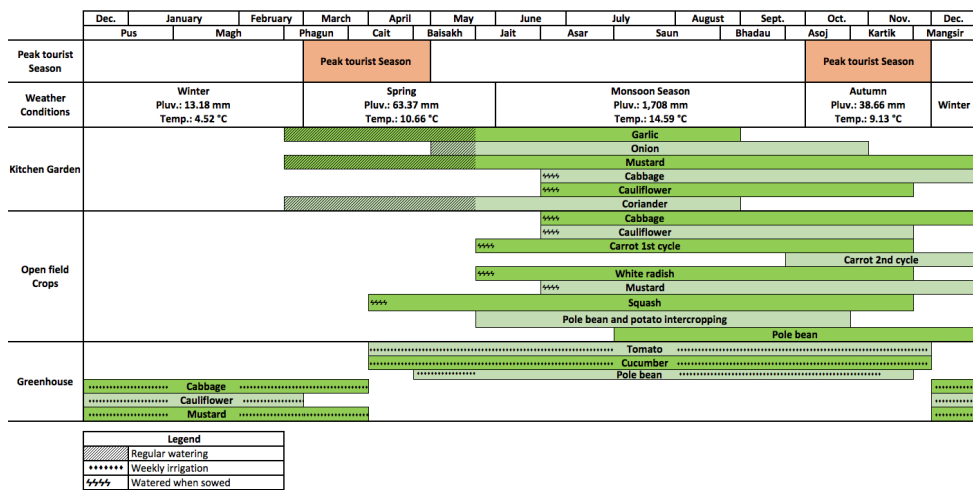
- 15 Then, taking advantage of their proximity to the towns of Phakding and Namche – both of which had many tourist lodges (respectively 27 and 54 in 2016 (Jacquemet, 2018)) –, many farmers living between the villages of Ghat and Monjo (Upper Pharak) started commercial market gardening. They introduced vegetables in their field crop rotations and were able to provide lodges with fresh in-season vegetables to satisfy the culinary expectations of Western tourists (Jacquemet, 2018).
- 16 The introduction, in 1996, of greenhouse vegetable gardening by the NGO World Wildlife Fund was a turning point in the changes that farming underwent in Pharak. Despite the opportunities offered by this innovation, it would be necessary to wait until the 2010s, however, for greenhouses to flourish. This delay can be attributed, at least in part, to the climate of insecurity engendered by the civil war (1996 to 2006), which precipitated a drop in tourist numbers (Cailmail *et al.*, 2007) and, consequently, a drop in demand for agricultural products. It was only with the return of tourists in 2007 (+13.3% per year, Sagarmatha National Park, 2015) that market gardening really took off in Upper Pharak. This resulted in an extension of field and greenhouse cultivated areas, attaining respectively 500 m² and 150 m² on average for those who currently practise it.

Greenhouse market gardening: a way of producing vegetables reserved for an elite

- 17 However, only a handful of willing farmers were able to master the practice of market gardening in greenhouses. These farmers, who we will describe as ‘innovators’ (Mollard, 1999), all shared the following traits: they belonged to the Sherpa ethnic group, resided in Upper Pharak, were involved in tourism and had knowledge of greenhouse cultivation techniques acquired during trips in Nepal or abroad. Mollard (1999) suggests that ‘although not exclusive to them, this role [of innovator] is often vested in local leaders. This group is motivated by two reasons: consolidating a social position and emulating others within the class.’ This description readily applies to our

case study: Sherpa innovators all came from influential families. Indeed, the large initial investment required to erect a greenhouse (~ € 8.5 per m²) was a barrier that only Sherpas with significant capital could overcome and only they could take on the financial risk this investment represented. They also saw that greenhouse vegetable gardening provided 1) the advantage of extending the period of vegetable production (12 months against 9 in the field) (Figure 3); 2) the ability to introduce species to the valley that were hard to cultivate in fields in this mountain environment (tomato, cucumber, chilli); and 3) the possibility of directly deriving value from the products by offering them on the menu at their own lodges – which ensured the profitability of the investment.

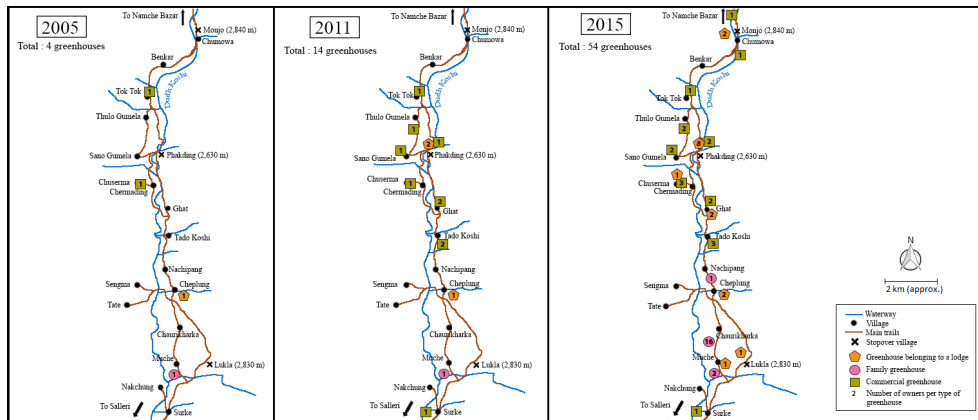
Figure 3: Vegetable cropping and irrigation calendar



Source: Abadia (2016) and Smadja *et al.* (2015) for rainfall and temperature data.

- 18 The innovators embarked on the commercial cultivation of tomato, a highly perishable crop that had previously been available only at extremely high prices on local markets and was often of poor quality. The news of the innovators' economic success spread rapidly, first through family networks and among Sherpas who owned lodges, then to other ethnic groups. It aroused the interest of farmers of Upper Pharak in greenhouse cultivation. Although they remain the minority, Rai, Tamang and Magar households from Solu, which have also prospered thanks to tourism, now have their own commercial greenhouses. Most of them run small hostels for porters and market gardening supplements this activity. There has been a surge in this trend since the early 2010s. Many lodge managers, irrespective of their ethnic group, now build their own greenhouses (50 to 80 m²) in order to supply their own establishments (Figure 4). They save money on buying vegetables while promoting local and organic menus to attract customers (Jacquemet, 2018). In 2015, Pharak had a total of about 6,000 m² of greenhouses.

Figure 4: Growth in the number of greenhouse owners in Pharak

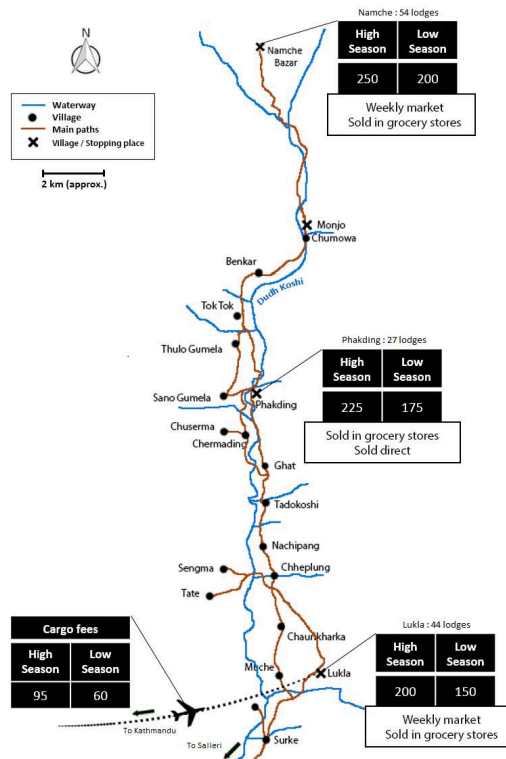


Source: Abadia (2016)

- 19 The availability of labour is a key factor in greenhouse vegetable cultivation. Indeed, irrigation, weeding and ventilation of a greenhouse are daily tasks, consuming approximately two hours over the day. This requirement is difficult to reconcile with tourism-related occupations that require travel. In addition, more and more children are being sent to Kathmandu to pursue their studies (Spoon, 2011). Family labour is therefore becoming scarce. Nevertheless, households with greenhouses rarely use hired labour to work in them. Some take the determined decision not to do so due to the difficulty in controlling major crop diseases (cabbage hernia, tomato apical necrosis) and to their desire to avoid the spread of these diseases by limiting as far as possible the likelihood of their plants coming into contact with individuals from outside the family or with their tools. Others cite the lack of experience of day labourers, since greenhouse cultivation requires some training (especially on how to trim tomato plants).⁶ It also seems that they are reluctant to pass on their knowledge to prevent any new entrants into what is a captive and promising market and to retain all the wealth created within their own families.
- 20 Therefore, only those who truly have the means of production (capital, land, labour) can invest in this innovation. This explains the failure of the few households in Cheplung and Chaurikharka (Figure 4) who built small greenhouses (20 m²) subsidised by the Italian project NGO Ev-K2-CNR in 2012. Indeed, this model of greenhouse use, designed for producing food for self-consumption, hardly caught on once the project ended because of the high investment required (purchase of plastic and wood) and the lack of availability of family labour. This observation underscores the fact that an investment in greenhouses can only be profitable from a commercial perspective, i.e., when it targets the most profitable markets.⁷
- 21 The spread of market gardening in the valley also depends on the 'physical' conditions of market access, i.e., how difficult and expensive it is for farmers to transport their production to its place of sale. Two distribution channels exist at present: on the one hand, direct sales to lodges (especially in Ghat and Phakding, which are two stopover villages with many lodges) and, on the other, weekly markets in Lukla and Namche to which vegetables have to be carried on foot. At these markets, Pharak market gardeners are forced to bring their selling prices into line with those of vegetables from Kathmandu, thereby having to accept price fluctuations (Figure 5). Since Namche does not have an altiport, prices there are higher and this town is therefore preferred by

producers, especially in October when a large tomato market is organised. These two distribution channels have driven the development of commercial market gardening in Upper Pharak, with Namche (about six hours' walk way) being too distant for Lower Pharak's market gardeners to visit every week. The prices prevailing in Lukla are not sufficiently remunerative to encourage them to sell their production there.

Figure 5: Selling price of tomatoes in Nepalese rupees per kg on different markets. High season: March to May and September to November



Source: Abadia (2016) and Jacquemet (2016).

- 22 Greenhouse gardening is therefore the preserve of an 'elite' capable of overcoming the barriers of market access, initial investment and availability of labour. This innovative agricultural diversification remains specific in its scope: pluriactive households that had moved away from agriculture are returning to this sector using financial means that are not available to ordinary farmers. Wealthy Sherpas who have thrived through tourism are further strengthening their position through this new practice and, in this way, exacerbating social inequalities already present in Pharak. Market gardening is still a limited sector:⁸ the valley continues to import a large part of its vegetables. For the moment, this remains a niche market, driven by the opportunities the development of tourism offers, but it is far from signifying a conversion of all agriculture to market gardening.

Mountain, market gardening and tourism particularities that combine well

- 23 Irrespective of their ethnicity, Pharak farmers, whether they sell their vegetables or not, rely on very similar, fully organic and manual production techniques. While it is no

doubt true that the valley's isolation and topography are not conducive to motorised mechanisation or to the supply and use of synthetic inputs, the fertilisation of market gardening using exclusively organic manure is above all the result of a conscious choice.

- 24 Vegetables are grown in fields from spring to autumn, in rotation with potatoes and cereals (Figure 3). The high rainfall (2,000 mm per year, 80% of which falls during the monsoon season (Smadja *et al.*, 2015)) allows farmers to practise rainfed agriculture.⁹ Water availability is a determining factor for the development of market gardening (Charlery de la Masselière *et al.*, 2009).
- 25 Greenhouses, on the other hand, can be used to grow vegetables all year round: mixed cropping of tomatoes, cucumbers and beans is carried out in the spring; cabbages, cauliflowers and mustard greens are grown during the winter (Figure 3). They are abundantly watered using water from the Dudh Koshi tributary streams via domestic water systems (Faulon, 2015) to which farmers connect their hoses. Some producers own reservoirs to cope with consumption peaks and to be able to use pressurised water for irrigation. While there may be a shortage in the spring during periods of low flows in mountain streams, there is currently no real competition for water (Abadia, 2016). However, even though water does not yet appear to be a limiting factor for market gardening production or the subject of competition between users, it could represent a new challenge in the future in the event of new installations (Aubriot *et al.*, 2019). There could be occasional shortages in villages with a large number of market gardeners (Ghat and Phakding in particular). The development of greenhouse gardening, if not accompanied by an improvement in water supply networks, could thus lead to the emergence of competition for water not only between farmers but also between its different uses (agriculture, domestic consumption, hydropower, tourism).
- 26 The tomato is undeniably the showcase vegetable. It is harvested and sold from the end of September to the end of November, during the high tourist season, at a very good price. In order to extend the harvest period as much as possible, several varieties are cultivated. Since it is a highly perishable vegetable, it is not practical to transport it all the way from Kathmandu. Pharak producers do not, on the whole, encounter any great difficulties in selling their production.
- 27 Winter vegetables are sold at the beginning of spring, when the first tourists of the year arrive. Producers take advantage of the relative short supply to sell their production at very good prices. By being able to create a microclimate in greenhouses that allows vegetable cultivation throughout the year and to time the harvests to coincide with the tourist demand, producers can develop a real production strategy based on peak tourist seasons.
- 28 For some producers, the farm and the lodge are inextricably linked: market gardening products find a direct outlet for tourists who consume them locally. This very short seasonal marketing channel contrasts with normal channels based on market dynamics: from the countryside to cities or from the plain to the mountains. Tourism has thus helped shorten distances considerably: trade with Tibet, which entailed a long journey, has been replaced by the sale of market garden products locally; the tourist as a consumer comes to the source or relies on a nearby market.
- 29 The specificity of tourist seasonality can also perhaps explain why milk production has not developed as much as elsewhere in Nepal, where market gardening products and

milk have become cash crops (Brown *et al.*, 2000; Paudel, 2002). The difference is that a city presents a continuous demand throughout the year for these products, whereas the seasonal tourist demand is best served by seasonal vegetable production. Paradoxically, it can be noted that Pharak, which was a livestock farming region, has given up breeding *chauri* and therefore milk production, and that tourists now consume drinks made from milk powder! The seasonality of the tourist market therefore partly explains the abandonment of livestock farming and the growth of market gardening.

Conclusion

- 30 By making available nutrient-rich vegetables to the local population, by contributing to the production of high value-added food products and by helping to maintain biodiversity, market gardening is an important lever of development for Nepal's rural areas (Gautam *et al.*, 2006). In Pharak, market gardening in fields for self-consumption now seems to be well integrated into crop rotations and it is very likely that households, across all social categories, will continue to practise it, provided that they are able to manage crop rotations properly. This type of market gardening requires very little investment and cash flow for its implementation, and is practised over small surface areas, with no mechanisation or irrigation, and is thus not affected by the existing constraints of Pharak agriculture.
- 31 The future of commercial market gardening, whether in fields or in greenhouses, is more uncertain. At the moment, this sector is competitive and provides market gardeners with a decent level of profits. It has been protected from outside competition and will continue to be so as long as the road network does not allow overland transportation of large quantities of cheaper vegetables. However, a road from the city of Salleri is under construction; it is expected to reach Lukla in a few years. Paradoxically, while everywhere else the development of market gardening is dependent on the construction of roads so that vegetable production can be sold, the arrival of the road in this high-altitude region could be detrimental to this form of agriculture since its vegetable production is not destined to be sold outside the region. On the other hand, as we have seen, the market has aligned itself with tourism, which is itself dependent on exogenous factors, such as the country's socio-political stability or even natural disasters such as the earthquakes of spring 2015.
- 32 Pharak has clearly experienced profound changes in its socio-economic organisation and consequently in agriculture. The boom in tourism has resulted in changes in the allocation of family labour, in the settlement of migrants from other ethnic groups, and in a growing demand for agricultural products. Among these transformations, the recent spread of market gardening in this region – which has indirectly benefited from the development of this practice in other parts of Nepal – is a particularly relevant illustration of the relationship of dependence that ties agriculture to tourism. Its seasonal character, in step with the tourist seasons, makes it a significant advantage but one from which only a small elite can benefit.

BIBLIOGRAPHY

- Abadia C., 2016.- « De la pioche au piolet : dynamiques agraires et diversification des pratiques maraîchères dans le Pharak, Népal », Mémoire présenté pour l'obtention du titre d'ingénieur en agro-développement international, ISTOM, 101p.
- Adhikari R., 2008.- "Economic Dimension of Empowerment: Effects of Commercialization and Feminization of Vegetable Farming on Social Status of women in an Urban Fringe of Western Nepal", in *Himalayan Journal of Sociology and Anthropology* vol. 3: pp.86-105, visited October 4th 2019, <https://www.nepjol.info/index.php/HJSA/article/view/1498>
- Agri-Business Promotion and Statistics Division, 2013.- "Statistical information on Nepalese agriculture 2012/2013". Kathmandu: Ministry of Agricultural Development, Government of Nepal.
- Aubriot O., Bruslé T., 2012.- « Agriculture paysanne népalaise et phénomènes migratoires : de la complémentarité à la rupture des liens? », in *Autrepart*, vol. 3/ 62, pp.141-158, visited October 4th 2019, <https://www-cairn-info.inshs.bib.cnrs.fr/revue-autrepart-2012-3-page-141.htm>.
- Aubriot O., Faulon M., Sacareau I., Puschiasis O., Jacquemet E., Smadja J., André-Lamat V., Abadia C., Muller A. 2019.- "Reconfiguration of the Water-Energy-Food Nexus in the Everest Tourist Region of Solukhumbu, Nepal", in *Mountain Research and Development* vol. 39. <https://doi.org/10.1659/MRD-JOURNAL-D-17-00080.1>
- Bahadur Thapa M., Dhimal S., 2017.- "Horticulture Development in Nepal: Prospects, Challenges and Strategies", in *Universal Journal of Agricultural Research*, vol. 5/3, pp. 177-189, <http://www.hrpub.org/download/20170430/UJAR1-10408807.pdf>
- Brown S., Shrestha B., 2000.- "Market-driven land-use dynamics in the middle mountains of Nepal", in *Journal of Environmental Management* vol. 59/3, pp.217-225.
- Cailmail B., Perier M., 2007.- « Lorsqu'un conflit local s'intègre dans la guerre globale au terrorisme : le cas des maoïstes du Népal », in *Cultures & Conflits* [online], vol. 68, consulted May 24th 2016, <http://conflits.revues.org/6243>.
- Charlery de la Masselière B., Nalileza B., Uginet E., 2009.- « Le développement du maraîchage dans les montagnes d'Afrique de l'Est : les enjeux », in *Les Cahiers d'Outre-Mer*, vol. 247, pp. 311-330.
- Cochet H., Aubron C., Jobbe-Duval M., 2009. « Quelles sont les conditions à réunir pour une intégration marchande porteuse de développement durable pour les paysanneries andines? », in *Les Cahiers d'Outre-Mer*, vol.247, pp. 395-417.
- Cochet H., 2011.- *L'agriculture comparée*, Editions Quæ. 159p.
- Debarbieux B., 1993.- « Du haut lieu en général et du mont Blanc en particulier », in *Espace géographique*, vol. 22/1, pp. 5-13.
- Dollfus P., Aubriot O., Lecomte-Tilouine M. 2009.- "Agriculture in the Himalayas: a historical sketch", in J. Smadja (ed.) *Reading Himalayan landscapes over time. Environmental perception, knowledge and practice in Nepal and Ladakh, Pondicherry (India)*, Institut Français de Pondichéry (Collection Sciences Sociales 14), pp. 279-323. .
- Duchet C., Duchier J.C., 2004.- « Diagnostic agraire dans les collines Himalayennes (Népal): des choux-fleurs dans les 'dokos'... Ou quelles stratégies pour les agriculteurs des collines proches de

- Katmandou ? » Mémoire (Diplôme d'Agronomie Tropicale). Montpellier, CNEARC: CNEARC et Isara (Lyon).
- Dufumier M., 1996.- *Les projets de développement agricole. Manuel d'expertise*, Editions CTA - Karthala. 354p.
- Faulon M., 2015.- « Hydroélectricité et adduction d'eau dans le Haut Pharak », Mémoire présenté pour l'obtention du diplôme de master recherche géographie, science de l'espace et du territoire, Université Bordeaux Montaigne, 142p.
- Fuller R., Zahnd A., 2012.- "Solar Greenhouse Technology for Food Security; A Case Study from Humla District, NW Nepal", in *Mountain and Research Development*, vol. 32/4, pp. 411-419, <https://bioone.org/journals/mountain-research-and-development/volume-32/issue-4/MRD-JOURNAL-D-12-00057.1/Solar-Greenhouse-Technology-for-Food-Security--A-Case-Study/10.1659/MRD-JOURNAL-D-12-00057.1.full>
- Furer Haimendorf (Von) C., 1964.- *The Sherpas of Nepal : Buddhist highlanders* , London, John Murray, 298 p.
- Gasselin P., Vaillant M., Bathfield B., 2014.- « Le système d'activité : retour sur un concept pour étudier l'exploitation agricole en famille », in Gasselin P., Choisis J.-P., Petit S., Purseigle F. & Zasser S. (eds), *L'agriculture en famille : travailler, réinventer, transmettre*, EDP Sciences, Les Ulis, pp.101-122.
- Gautam R., Sthapit B.R., Shrestha P.K., 2006.- *Home Gardens in Nepal*. Proceeding of a workshop on "Enhancing the contribution of home garden to on-farm management of plant genetic resources and to improve the livelihoods of Nepalese farmers: Lessons learned and policy implications", 6-7 August 2004, Pokhara, Nepal. LI-BIRD, Biodiversity International and SDC. 135p.
- Jacquemet, E. 2018.- *La société sherpa à l'ère du « Yak Donald's »*. *Lutte des places pour l'accès aux ressources dans la région touristique de l'Everest (Népal)*. Thèse de Doctorat de géographie. Bordeaux: Université Bordeaux Montaigne. 432p.
- Mazoyer M., Roudart L., 1997.- *Histoire des agricultures du monde, du néolithique à la crise contemporaine*, Editions du Seuil. 533p.
- Mollard E., 1999.- « L'innovation est-elle risquée ? : un point de vue agro-économique », in: Chauveau J.P., Cormier-Salem MC., Mollard E. (eds). *L'innovation en agriculture : questions de méthodes et terrains d'observation*. Paris: IRD, pp. 43-64.
- Muller A., 2016.- « Gestion des animaux de bât et des systèmes fourragers dans une aire de montagne touristique et protégée. Le cas de la vallée du Pharak, Népal » Mémoire présenté pour l'obtention du titre d'ingénieur en agro-développement international, ISTOM. 139p.
- Muzzini E., Aparicio G., 2013.- *Urban Growth and Spatial Transition in Nepal. An initial assessment*. Washington: The World Bank. Available at: <https://issuu.com/world.bank.publications/docs/9780821396599>.
- Nepal SK., 2005.- "Tourism and Remote Mountain Settlements: Spatial and Temporal Development of Tourist Infrastructure in the Mt Everest Region, Nepal", in *Tourism Geography* vol. 7/2, pp. 205-227.
- Nepal Planning Commission, 1973.- "The fourth Plan", Government of Nepal. http://www.npc.gov.np/images/download/fourth_eng.pdf.
- Nepal Planning Commission, 1980.- "The fifth Plan (1975-80)", Government of Nepal. http://www.npc.gov.np/images/download/fifth_eng.pdf.

- Oppitz, M., 1974.- “Myths and facts: Reconsidering some data concerning the clan history of the Sherpas”, *Kailash* vol. 2/1-2), pp.121 – 131.
- Paudel G.S., 2002. – “Coping with land scarcity. Farmers’ changing land-use and management practices in two mountain watersheds of Nepal”, in *Norsk Geografisk Tidsskrift - Norwegian Journal of Geography* vol. 56/1, pp.21–31, <https://doi.org/10.1080/002919502317325740>
- Ripert B., Sacareau I., Boisseaux T., Tawa Lama S., 2009.- “Discourse and Law: resource management and environmental policies since 1950”, in J. Smadja (ed.) *Reading Himalayan landscapes over time. Environmental perception, knowledge and practice in Nepal and Ladakh, Pondicherry (India), Institut Français de Pondichéry (Collection Sciences Sociales 14)*, pp. 379-417.
- Sacareau I., 1997.- *Porteurs de l’Himalaya : Le trekking au Népal*», Editions Belin. 256 p.
- Sagarmatha National Park, 2015.- “Sagarmatha National Park Jorsalle Entry Point: Monthly Tourist Record”, Department of National Park and Wildlife Conservation.
- Sagarmatha National Park, 2017.- “Sagarmatha National Park Jorsalle Entry Point: Monthly Tourist Record”, Department of National Park and Wildlife Conservation.
- Sherpa MN, 1985.- *Conservation for survival: a conservation strategy for resource self-sufficiency in the Khumbu region of Nepal* [Thesis]. Winnipeg, Canada: University of Manitoba.
- Shrestha B., 2008.- “Off-Season Vegetables Marketing Channels of Small Growers: A Case of Yampaphant, Tanahun, Nepal”, Wageningen: The Netherlands. 81p.
- Shrestha R.B., Huang W.-C., Gautam S., Johnson T.G., 2016.- “Efficiency of small scale vegetable farms: policy implications for the rural poverty reduction in Nepal”, in *Agricultural Economics (Zemědělská ekonomika)* vol. 62/ 4, pp.181–195
- Smadja J., Aubriot O., Puschiasis O., Duplan T., Grimaldi J., Hugonnet M., Buchheit P. 2015.- “Climate change and water resources in the Himalayas . Field study in four geographic units of the Koshi basin, Nepal”, in *Revue de géographie alpine* vol. 103/2, consulted on September 4th 2015, <https://journals-openedition-org.inshs.bib.cnrs.fr/rga/2910>
- Spoon J., 2011.- “Tourism, Persistence, and Change: Sherpa Spirituality and Place in Sagarmatha (Mount Everest) National Park and Buffer Zone, Nepal”, in *Journal of Ecological Anthropology*, vol. 15/1, pp. 41-57.
- Stevens S., 1993.- “Claiming the High Ground: Sherpas, Subsistence, and Environmental Change in the Highest Himalaya”, Berkeley: University of California Press, <http://ark.cdlib.org/ark:/13030/ft8b69p1t6>.
- Thapa G., Kumar A., Joshi P.K., 2017.- “Agricultural Diversification in Nepal: Status, Determinants, and its Impact on Rural Poverty”. International Food Policy Research Institute. Discussion paper. 56p.
- Tulet J.C., 2009.- « Transformations des systèmes de production agropastoraux concernant le monde tropical », in *Les Cahiers d’Outre-Mer*, vol. 247, pp. 275-283, visited October 4th 2019, <https://journals-openedition-org.inshs.bib.cnrs.fr/com/5647>.

NOTES

1. Until 2017, Pharak came under the ambit of the Chaurikharka Village Development Committee (VDC). Since the re-demarcation of administrative boundaries in 2017, it belongs to the new Khumbu Pasang Lamo Gaon Palika (rural municipality).

2. It was interrupted by the devastating earthquakes of April-May that year.
 3. The 2011 national census listed 968 houses and 3,700 inhabitants in Chaurikharka VDC.
 4. Female hybrid resulting from a cross between a male (*yak*) or female (*nak*) of the *Bos grunniens* species and a cow or a bull (*Bos taurus*).
 5. . Cabbage, cauliflower, beans, squash, carrots, green onions and garlic, according to our surveys.
 6. Some farmers, previously day labourers, now practise greenhouse vegetable gardening on their own, having acquired the requisite knowledge while working for their former employers.
 7. Many NGOs, however, provided farmers with greenhouses in the districts affected by the 2015 earthquakes to allow them to grow food for self-consumption. This also happened earlier with the establishment of solar greenhouses at Humla for food security purposes (Fuller and Zahnd, 2012).
 8. The annual production of tomatoes is estimated at between 12 and 18 tonnes for the whole of Pharak (Abadia, 2016).
 9. However, spring vegetables such as garlic, onion and mustard greens are irrigated.
-

ABSTRACTS

Pharak region, traversed by the Everest trekking route, sees thousands of hikers come through each year to discover the Khumbu high-mountain landscapes. Formerly a region devoted to livestock farming, Pharak has experienced significant socio-economic changes since the early 1970s. The predominantly Sherpa population is gradually abandoning agro-pastoral activities in favour of greater participation in the tourism industry. By generating economic benefits, creating demand and capturing part of the labour force, tourism is engendering important transformations in the region's agriculture. Trade is on the increase and market opportunities are reconfiguring the agrarian landscape. Market gardening, in particular, is gaining momentum and has become a new local business. This article highlights the originality of this mode of farming, which has developed in tandem with the growth of tourism but independently of the growth of cities and the construction of roads.

INDEX

Mots-clés: agriculture, market gardening, greenhouse, tourism, Nepal

AUTHORS

ABADIA CÉLINE

Agricultural engineer, ISTOM graduate (College of International Agro-Development)

AUBRIOT OLIVIA

CNRS-CEH (Centre d'études himalayennes), Campus Condorcet. Bâtiment de recherche sud, 5 cours des Humanités, 93322 Aubervilliers Cedex, France

SMADJA JOËLLE

CNRS-CEH (Centre d'études himalayennes), Campus Condorcet. Bâtiment de recherche sud, 5
cours des Humanités, 93322 Aubervilliers Cedex, France

VAILLANT MICHEL

UR ADI-Suds (Agrodéveloppement et innovation aux Suds), 4 rue Lakanal, 49000 Angers, France

OSWALD MARC

UR ADI-Suds (Agrodéveloppement et innovation aux Suds), 4 rue Lakanal, 49000 Angers, France