Re-thinking Development after Disaster – Notes on Post-earthquake Reconstruction Planning in the Central Himalayas, Nepal

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Abstract This essay is based on a field survey in the central Himalayan highlands, Nepal, badly hit by earthquakes in spring 2015. The affected remote communities have always been constrained by spatial and economic marginality and have suffered not only from the earthquakes but also a number of geophysical hazards and economic problems, including the inexorable outbound migration of young and adult workforce in recent decades. Accordingly, they are one of the most vulnerable communities in Asia. Post-earthquake reconstruction represents an opportunity to reduce their vulnerability, to foster collective resilience, to stop (and reverse) outbound migratory movement by employing local workforce in recovery and reconstruction projects, and to develop a sustainable economy through use of well-targeted economic and fiscal policies and encouragement of entrepreneurial activism. Reducing human vulnerability is key to fostering sustainable economic development after disaster.

Keywords: • development • disaster • hazard • resilience • sustainability • vulnerability

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1 The Himalayan disaster: Nepal earthquake, 2015

Nepal was hit by two strong earthquakes in 2015: the first on Saturday 25th April when a very strong tremor (7.8 Richter scale) hit Gorkha district; and a second one (7.3 Richter scale) on Tuesday 12th May with an epicenter near the district of Sindhupalchok bordering Dolakha, on the same fault-line, probably as a result of a strong after-shock. The central-eastern highlands and valleys of Nepal were hit, including the capital, Kathmandu. This caused destruction on an enormous scale, affecting the lives and livelihood of millions, and disseminating widespread distress. The earthquake killed and injured thousands of humans and animals. Settlements, infrastructure, geo-hydraulics and ecosystems in the central Himalayas received serious jolts, causing a long trail of destruction and despair. A major natural incident (the earthquake) soon turned into a human tragedy on a massive scale. This disaster re-affirmed the fragility of human habitats in the central Himalayas and underscored the vulnerability of its inhabitants. Two devastating quakes were followed by hundreds of aftershocks and tremors. Tremors continued for months, frightening the already battered population.

Figure 1: The epicentres of 2015 earthquakes in the central Himalayas

Source: Pant (2016, 8).

According to Nepalese government records, there were 8,790 human casualties (deaths) and many more (22,300) severely injured. More than half-a-million houses were destroyed, leaving the owners and tenants homeless and internally displaced. It is estimated that the lives of eight million people, a little less than one-third of the total population of Nepal, have been badly affected. Thirty-one of Nepal's 75 districts were struck, out of which 14 high-altitude rural districts were the worst-hit (NPC 2015). In some areas, settlements and croplands were swept away by avalanches and landslides triggered by earthquakes and tremors. It was the worst natural disaster to strike Nepal since the big earthquake of 1934.

2 Vulnerability exposure

The 2015 earthquake has exposed the vulnerability of Nepalese people. The magnitude of damage caused by the earthquake is largely a result of pre-existing vulnerabilities. Had these vulnerable conditions been properly addressed long before the earthquake, then the extent of destruction and loss could have been significantly lessened. Vulnerability is a combination of institutional, infrastructural and socioeconomic conditions that limits the ability of people living in hazard-prone areas to withstand, cope with and mitigate the effects of a hazardous event (Blaikie *et al.* 1994).

Emergency relief work and immediate (post-emergency) support systems involve transitional action which is, understandably, carried out speedily, without in-depth analysis. Nepal's emergency response was admirable in the immediate aftermath of the earthquake of 2015. Rescue missions were conducted in every place of distress. Relief materials were distributed. Health crisis (starvation, epidemics) and breakdown in law and order (chaos, anarchy) were avoided. Nepal's security forces worked hard and performed quite well, despite being under-resourced and overstretched in terrain that is very rugged and difficult to work in.

Post-disaster reconstruction is very different from emergency management. In terms of local characteristics, every place has unique post-disaster features, thus effective recovery solutions must be calibrated as per the local circumstances and an assessment of local vulnerability and capability. Post-disaster management demands well-informed policy-making and careful planning. Before committing huge amounts of resources and deploying a wide range of skills for recovery and reconstruction, four sets of knowledge have to be obtained:

- Scientific understanding of all potential hazards.
- Historical memory of previous disasters, and lessons learned from previous post-disaster management.
- Periodical technical assessment of the geophysical, environmental and infrastructural vulnerabilities; and their post-disaster evolution in the disaster-hit habitats.
- Anthropological comprehension of the preexisting institutional and socioeconomic vulnerabilities and capabilities of people affected by the disaster, and of the new risks and uncertainties contributed by the disaster.

Post-disaster recovery is a complex process that involves almost all social spheres and economic sectors and requires close collaboration between public institutions and private actors as well as other agencies (NGOs and international bodies). Close collaboration among all stakeholders helps to grasp local vulnerability. Local communities should be helped through the provision of scientific and technical support to define and manage their own vulnerabilities and capabilities. Aided by technical support from external

agencies, a community-based, contextual and proactive approach to vulnerability is perhaps the best approach (Wisner 2008).

In the aftermath of 2015 earthquake, Nepal's vulnerability due to institutional deficiencies was exposed. The absence of locally elected governing bodies at municipal and district levels proved to be a serious handicap to a timely and systematic reconnaissance of the impact of disaster and for accurate information and data collection. Non-elected state-government teams, charities, security forces, etc. were limited in terms of grasping the details and peculiarities of the local reality. They had difficulty in reaching the grass-roots level. The mobilization of government workers becomes effective only if there is a valid and well-representative local institutional counterpart. The decentralization of the institutional framework is key to delivering relief and reconstruction programs, as well as to ensuring full recovery and economic development after the disaster (Lyons *et al*. 2010).

The void in local governance was a direct result of a long period of political instability caused by bargaining, brokering and bickering among the contenders for power, even after the end of a decade-long (1996–2006) Maoist insurgency. An active institutional counterpart, representing the local community, was not available to coordinate recovery until recently.[1] Even non-elected administrative officers (municipal secretaries) were absent in many villages when the earthquake struck.[2] This was one of the serious limits faced by relief workers in the immediate aftermath of the earthquake. Later, this also caused delays and confusion in terms of fact-finding, planning and providing reimbursement to victims by the newly instituted National Reconstruction Authority (NRA), besides the political bickering and bargaining (i.e., delay) over the composition and nomination of the NRA itself.[3]

In Nepal, the vulnerability of already vulnerable people such as those with physical disabilities, the sick and under-treated, pregnant women, young children, very old persons and single-parent households became worse compared to the pre-earthquake period. Women were particularly hit hard as they were most likely to be busy indoors performing household work when the quake struck. The active adult workforce in Nepal's rural highlands consists mainly of women and the elderly; both suffered badly (many young adults had left their villages long before the earthquake). Political instability combined with poverty and the lack of off-farm opportunities drove away waves of able-bodied natives from the rural highlands to work in the towns and roadside trading posts (*bazars*) of the largest urban conglomerate (Kathmandu valley), and to the urban areas of southern lowlands. A majority ended up in sub-standard periphery (and often unauthorized) settlements. Many have gone abroad to earn money that they can send money back to their families.[4] The absence of the able-bodied during the relief action in the immediate aftermath of the disaster proved a serious problem. Political instability and rural poverty caused widespread socioeconomic vulnerability which has caused the massive exodus of able-bodied youngsters and adults in the recent past. The absence of the able-bodied

rendered the remaining people (mostly women, children and the elderly) even more vulnerable; it added another layer of vulnerability. As a result, the destructive effects of earthquake became disastrous. After the earthquake many more left as the reconstruction process slowed down due to politicking and bureaucratic procedures. The state's offers of compensation and technical delivery proved to be far below the quantity and quality required.

Those most affected by the disaster are farming and herding communities concentrated in the mountainous districts of central-eastern Nepal. Smiths, craft-workers and retail traders have been hit hard. The earthquake has affected people engaged in farming and herding, retail trading, crafts and services, with their fewer properties and lower incomes and with very little means of reconstructing their shelters and livelihood-related structures. Large business structures, usually constructed in reinforced concrete, suffered less physical damage. Small home-based businesses (cottage enterprises) suffered badly, crippling the ability of many to make a livelihood, and making them vulnerable to financial bankruptcy, physical and mental health problems. The 2015 earthquake devastated relatively neglected (marginal) socio-spatial contexts such as the scattered rural hamlets of high-altitude regions and was a disaster for the poor rural folk of mountain districts who already had few material resources and very difficult logistical conditions.

The aftereffects of the earthquake manifested as formidable risks and challenges: more outbound migration of the able-bodied, an increase in pressure on existing facilities and services in urban areas (more slums and shanty-towns), health and safety problems, public security concerns, illicit trade, and further burdens on the shoulders of police and criminal justice offices. Disasters trigger multiple disruptions in civic and economic life. Later, these effects are amplified by further secondary disruptions of livelihoods, critical infrastructure, the supply system, and law and order. Disastrous events involve a long causal chain of crisis and hardship, generating secondary and tertiary disasters from the interaction between anthropogenic and natural elements as "cascading" effects. Careful analysis of such cascading risk is essential to identifying solutions for recovery and resilience-enhancement (UNISDR 2017).

Post-disaster disruption and dysfunctionalities are particularly difficult for vulnerable categories of society, and even more so in politically unsettled and economically weak countries like Nepal. The after-effects of large-scale disasters unfold as a myriad of problems for society, and can trap already vulnerable sections of society in chronic poverty and perpetual vulnerability. Disaster hits hard those who are already vulnerable, and those who are hard hit become even more vulnerable.

"Vulnerability" is the key term for understanding the long-term effects of disasters. Some sectors of society are more vulnerable compared to others, and more exposed to harm and loss in the case of a hazardous event. Socioeconomic processes related to economic

inequality and the hierarchical power structures of a country are said to be responsible for the unequal exposure of individuals to risks in society (Bankoff and Hillhorst 2008). In the case of Nepal, we should also mention spatial disadvantages; i.e. the geographical marginality of the rural highlanders.

3 Understanding human vulnerability in Nepal

Nepal is one of the poorest and least developed countries in the world. Among 179 nations surveyed, it is ranked 30th from the bottom according to the World Bank (2018).[5] Vulnerability has generally been associated with poverty. Poverty exacerbates the negative effects of hazards and accidents and thus contributes to further vulnerability. Poverty certainly represents a deficiency in terms of facing risks, but poverty is not vulnerability in itself (Cardona 2008). Some wealthy and developed places may be exposed to high levels of risk (e.g. Japan and Taiwan in Asia to earthquakes and typhoons, California in the USA to drought and earthquake, The Netherlands in the EU to floods). However, such countries may be less vulnerable due to their capacity to cope with risks. There are many other factors involved in vulnerability such as demographic factors (i.e. population density, composition, proportions, trends etc.), infrastructural predisposition, institutional preparedness, public awareness, social cohesion (solidarity), etc. Many less developed countries may not be exposed to high risks of hazard, but may have some in-built deficiencies (including massive poverty) that increase the difficulty of facing risks.

As far as vulnerability is concerned, risks and poverty are important factors, but not all of them. From the point of view of vulnerability, more important are geophysical features, demographic parameters (number, concentration, density), infrastructure, settlements and buildings, as well as public awareness and the institutional mechanisms to respond quickly. The risk of a natural hazard or an accident turning into a tragic disaster depends only partly on poverty or on the force of the event itself. The conventional classification of countries – "least developed," "developing," "developed," "low income," "middle income," "high income," etc. – is not sufficiently applicable for assessing vulnerability and helping define risk-reduction strategies. It is better to consider the geophysical and environmental situation, demography, housing and settlement patterns, infrastructure, social cohesion and institutional realities of a place – of a town, a village area or a district. These place-systems should be assessed in terms of their susceptibility, short-term coping capacity, and long-term adaptation strategy (Welle *et al.* 2013).

Scholars and policy-makers have discussed different approaches to assessing vulnerability. There seems to be some agreement that the best way is to combine the demographic and taxonomic approaches of technical experts and professional planners with situational and contextual assessment conducted through local community participation (Wisner 2008). The updated guidelines (the "Sendai Framework") issued by the United Nations for disaster risk reduction define a priority order: **a**) understanding disaster risk; **b**) strengthening disaster risk governance to manage the risk; **c**) investing in

disaster risk reduction for resilience; **d**) enhancing disaster preparedness for effective response and for recovery, rehabilitation and reconstruction (UNISDR 2015). The critical issues of human vulnerability are included in the third priority (i.e. investing in disaster risk reduction for resilience).

The government of Nepal has announced its commitment to UNISDR's Sendai Framework. It has declared it will increase investment in disaster risk prevention and risk reduction through all those measures which are essential to enhancing the resilience of communities as well as their environment and assets. According to the special agency of the Nepalese government for emergencies (NEOC 2018), the major sources of human vulnerability in Nepal, in order of damage and distress, are: first of all, road accidents; then epidemic outbreaks, earthquakes, landslides, floods, heavy snowfall and snow-storms, and drought.

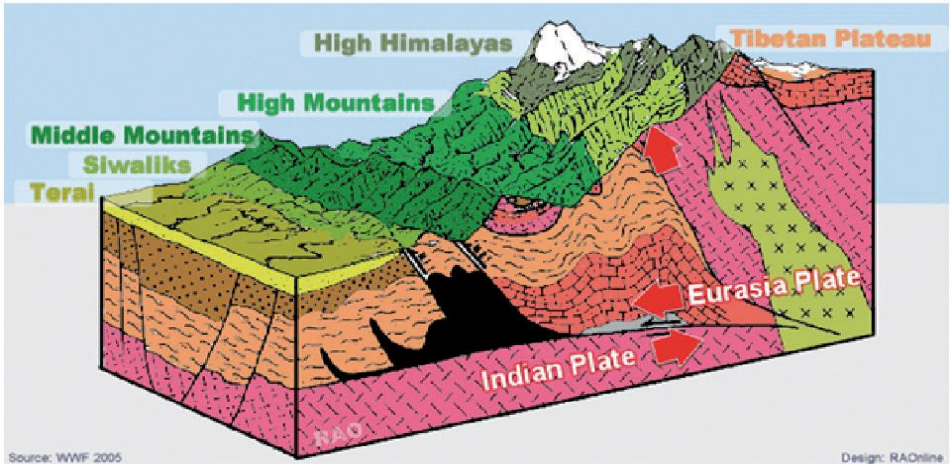
Our studies and field surveys have revealed that vulnerabilities are exacerbated by poverty, and that poverty is perpetuated by vulnerabilities; a vicious cycle indeed. We have identified some key vulnerabilities in Nepal that are responsible for frequent disruptions and setbacks in people's lives and livelihoods and which expose them continually to mortal risks. In identifying the key vulnerabilities, we have taken into consideration the *level* and frequency of risk to normal people's lives and livelihoods. We have identified four key vulnerabilities in Nepal:

- Geophysical vulnerability;
- Human habitat vulnerability;
- Road traffic vulnerability;
- Environmental vulnerability.

4 Geophysical vulnerability and eisk-reduction measures

For centuries, earthquakes have hit Nepal, which lies between the trans-Himalayan outskirts of the arid and cold Tibet-Qinghai high plateau in the north (bordering China) and the *cis*-Himalayan fringes of the Gangetic plains with a warm sub-tropical climate in the south (bordering India). Around 85% of the entire national territory of Nepal is made up of mountains and hills, where human settlements are located mostly on steep slopes that merge into the relatively flatter and wider bottoms of V-shaped river valleys located between 200 and 4000 meters above sea-level. Everywhere in Nepal, from the flat lowlands to the high slopes, human habitats are vulnerable to seismic activity due to the fact that Nepal sits on the boundary of two massive tectonic plates that are in a perennial process of adjustment after millions of years of collision.

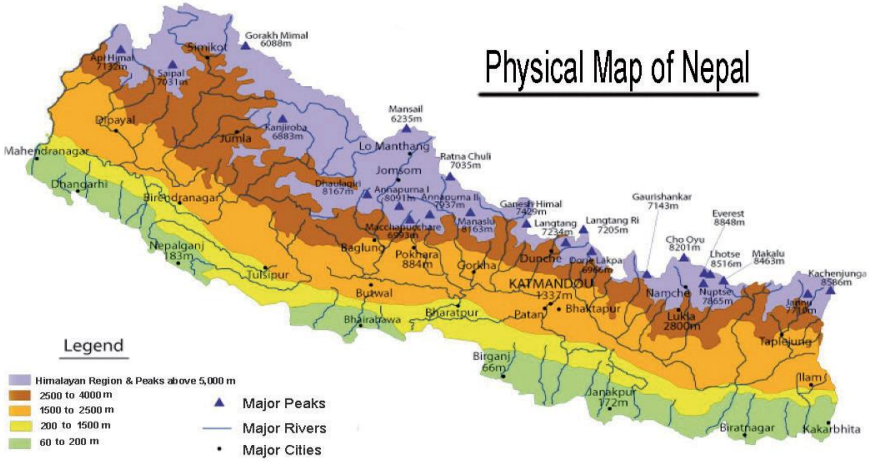
Figure 2: The Himalayan faultline



Source: Pant (2016, 17).

Land safety is problematic across the Himalayan region and surrounding, because the entire region sits on the fault lines of the Indian and the Eurasian tectonic plates. Nepal is located in the central and the highest portion of the Himalayan region, thus is the most exposed to the tremors and upheaval of the fault lines. These two massive tectonic plates collided to build the great Himalayan range millions of years ago. The ever-going convergence of these tectonic plates means relatively frequent earthquakes. More frequent than the earthquakes are the geohydraulic hazards. Landslides are frequent on the steep slopes all over Nepal. The threat of glacial lake bursts in the upper Himalayas is quite serious. In the summer monsoon period, heavy rainfall triggers excessive surface run-off and landslides on the mountain slopes, and flash floods in the steep catchments. Deforestation and land degradation have increased the risk of floods and soil erosion – not only in the mountains but also in the flat and wide southern lowlands (the northern fringe of the Gangetic plains).

Figure 3: Physical map of Nepal



Source: Pant (2016, 17).

Nepal needs an integrated environmental strategy centered on watersheds and eco/bio-regions that encompasses both highlands and lowlands. The newly established seven large administrative regions (*Pradesh*)[6] do not match the scientific criteria for watershed and eco/bio regionalism, but are constructed according to quite vague (politically compromised) criteria concerning ethno-linguistic and demographic patterns. Consequently, environmental protection, land-use policies and land safety measures are going to be quite problematic in the coming years.

Figure 4: Nepal's new administrative regions

Source: Wikimedia Commons (2019).[7]

Damage from quakes and aftershocks has not been uniform even within the same area. As highlighted by many studies in the aftermath of the 2015 earthquake, a significantly higher number of structures collapsed, causing deaths and injuries in the new settlements that had been established only in the last few decades (SGEB 2015). This was due to surface run-off on terrain susceptible to water pressures and sub-soil conditions (Okamura *et al.* 2015). Geo-technology experts recommend proper identification of sub-soil conditions, cracked river embankments, rocks, and destabilized slopes, because these all pose dangers in the case of excessive snowfall and rainfall, as well as in the case of later tremors (Chiaro *et al.* 2015).

In Nepal there are not enough good experts in the scientific and technical disciplines related to land safety. The scientific and technical education related to land safety must be expanded and improved as quickly as possible. More urgently needed are local (grassroots) level land-safety campaigns, basic training and local empowerment programs. Land safety work must begin with surface run-off management, not only of permanent natural streams (which swell during the summer monsoon rains) and all other rainfall-induced random temporary flows, but also of the water discharged from cultivated terraces and human settlements. The multitude of small surface run-offs must be well managed through a proper system of coordinated drainage at all levels, from tiny

hamlets and cultivated terraces to large watersheds formed by torrents on slopes and by major streams at the bottoms of valleys. Besides the management of surface run-off conveyance and protection of settlements and infrastructure, some other permanent measures are necessary:

- Constant monitoring of the geo-hydro configuration and trends at a local level;
- Local (municipal)-level institutionalization of risk assessment and early warning systems;
- Training for local people and administrators;
- Well-organized and continuous public awareness/notification campaigns regarding hydro-geological risks, locally manageable solutions for prevention, care and control;
- Implementation of well-targeted local, community-led re-forestation programs;
- Improvement of forestry practices in the existing woodlands;
- Expansive re-greening activities in private compounds, company premises, premises of public buildings, side-spaces of infrastructure;
- Public and communal spaces should be used, as much as is technically feasible, for re-greening by using land-stabilizing plantations (e.g. bamboo or *pipal*[8]);
- Haphazard locally initiated activities aimed at carving out vehicle tracks in the mountains should be restricted, because such invasive activities have increased the vulnerability of already fragile slopes.

All this implies that the role of the local community as "ecological sentinel" must be strengthened. The active involvement of communities in terms of mapping their vulnerabilities and assessing them is a key element in reducing geophysical vulnerability. The capability of vulnerable people to reduce their own vulnerability should be developed (Delica 2001; Delica-Willison and Willison 2004).

5 Habitat vulnerability and risk-reduction in housing and settlement planning

Earthquakes occur infrequently, but they are unpredictable, inevitable, and sometimes extreme. Their effects can be mitigated by improving the quality of buildings and infrastructure, and by well-rehearsed and well-resourced emergency planning, but only up to a certain point. In contrast, more frequent risks (e.g. flooding, landslides, road accidents, etc.) can and should be substantially prevented through early warning systems, land-use planning, design practices, building methods and regulations, as well as social and economic policies that target vulnerability reduction. Strong political will is needed to ensure that adequate financial and technical support is provided by the government to people in order to reduce their vulnerability related to housing and settlements. We suggest applying the following basic financial and technical assistance measures to reduce habitat vulnerability in Nepal:

- Offering full financial grants and free technical assistance for a family's first shelter and livelihood-related structures to all who have been hit by earthquakes or landslides.
- Providing partial financial grants (proportionate to the damage) and free technical support for the first shelter (home) and livelihood-related structures.
- Strictly enforcing scientific codes – not only for buildings, but also for surface run-off water management, waste management, hygiene and sanitation facilities.
- Offering financial grants and technical help only to those who adhere to the codes of "basic habitability" (Gesto and Perea 2012).
- For tenants and other non-owners, providing soft (low-interest, long-term) loans for acquiring land-plots, but free technical assistance and full financial grants for building family shelters and livelihood-related structures.
- Giving only technical advisory help and no financial grants in the case of secondary purpose buildings (vacation homes, property for rent, recreational structures).

Post-disaster recovery represents an opportunity to rationalize local development plans that address public safety, service delivery and critical infrastructure. Critical infrastructure and basic services should be as accessible as possible to existing households: this should be a major priority, rather than building new buildings in new settlements.

In Nepal, private houses in traditional rural settlements in the mountains are generally scattered and located close to cultivated land-plots, water sources, relatives, and kinsfolk; and often in proximity to a place of cult, worship or memory that has a cultural (and spiritual) meaning to the community. The location of private houses reflects livelihood-related needs as well as family bonds, community relations, and cultural traditions. The traditional scattered rural settlements in the central Himalayan highlands represent a coherent place system of functional, affectionate and symbolic interactions among inhabitants, as well as between inhabitants and their environment. The scattered location of private households makes people self-reliant in terms of basic necessities. It enables them to keep their animals and herds under constant supervision, and to manage (compost) domestic biodegradable waste in their own backyards. The scattered rural setting prevents the quick spread of contagious diseases and safeguards family privacy.

The idea of creating new integrated and compact settlements (*ekikrita basti*) by relocating and concentrating private households in a new safe spot may increase human vulnerability. Instead of making people safer and the delivery of services more cost-effective, the new compact settlements may create new problems, extra burdens and increase cost. They may also diminish villagers' self-reliance and create serious difficulties with managing waste and community hygiene. Therefore, people should be left freely to build their houses and livelihood-related structures wherever they choose within the boundaries of their land property once land safety conditions are ascertained. Except for the criteria of land safety and safeguarding of protected areas, there should be

no interference in people's choice of location for their shelters and livelihood-related structures. The government should, instead, create a common strategic space for people in all rural municipalities. The administrative and commercial centers of the rural municipal headquarters should be designed and built as strong and resilient fortified citadels; the common fortresses of the local community (*Sāmudāyika Durga*).

Figure 5: Rural municipal centre as the community fortress

Source: Pant (2016, 42).

Municipal centers should be developed as the safest nucleus of a territory, as community fortresses and as the permanent logistic hubs where all public and commercial facilities are based and from where all services are coordinated. They should serve as the base camps from where squads of government and security personnel, health workers, teachers and trainers, technicians, maintenance workers, service-providers, traders, volunteers etc. can go to outlying villages as required by the situation; both for ordinary routine tasks and trades, as well as for emergency missions. In normal times they should function as business hubs, while in the case of emergencies they should be a readily available safe haven. In the past, fortified citadels served as the permanent centers of local governance or as defensive structures or emergency shelters for the community.[9] In places like Nepal's mountain districts, these concepts are very relevant today. Municipal centers in ideal cases are symbols of local identity.

6 Vulnerability reduction as the guiding principle for transportation planning

The 2015 earthquakes damaged many roads and bridges. However, floods and landslides do even more damage, and more frequently. Nepal's roads are sub-standard. Far from being affordable to ordinary citizens, motor vehicles have become a status symbol for Nepal's consumerist middle- and upper-class, and motorable roads are synonymous with "development". National and local politicians from all ideological groupings totally agree to accord highest priority to construct motorable roads. As a result, expansive

motorization has led to land degradation, congestion, pollution, accidents (death and injuries), and a foreign trade imbalance (import of vehicles, spare parts, and fossil fuel). Nepal's main roads are frequently clogged because of narrow lanes (due to the constraints of the terrain). Poor maintenance and reckless driving create additional risks. A road trip in Nepal is quite troublesome and often dangerous; accidents are frequent. Road safety has become a serious issue, increasing people's vulnerability. Even before the earthquake, vehicle-related accidents ranked as the number one cause of health burdens in Nepal.[10] According to Nepalese police, road accidents constitute one of the top ten public security concerns and are one of the ten most numerous causes of criminal justice cases (NP 2017). The vast majority of victims of traffic accidents are pedestrians, passengers and cyclists (and animals). Nepal's policy-makers and planners seem eager to build more motorable roads and to widen existing roads to make room for more vehicles, while ignoring the need for walkable lanes and spaces for the free movement of people. Nepal's urban areas have become polluted and unwalkable. Similarly, the rural areas of Nepal are increasingly polluted and less walkable. As a consequence, human vulnerability has increased everywhere. As post-earthquake reconstruction of transport infrastructure is proceeding, new planning based on "vulnerability reduction" is needed. Considering people's daily needs, geophysical conditions, socioeconomic realities and local business development prospects (including tourism), Nepal's transportation infrastructure planning should be based on the following priorities, in descending order:

- **Walkability**[11] **as the top priority**: Nepal already has trekking trails with suspension bridges that are used by pedestrian travelers, traders, herders and animals. After the introduction of motor vehicles many are in disuse, and many need repair. It is time to restore, refurbish and maintain all of the pedestrian trails and bridges. Appropriate signal systems are needed for the pedestrian trails, bicycle routes and other non-motorized traffic paths. Why should only motorable roads have public information signposts and milestones? Non-motorized networks should be considered equally important as an alternative and complement to motorable roads. Non-motorized networks should intersect and converge with motorized ones. Each and every stop/junction of motorable roads and ferry-boats must serve as the starting point/terminal of non-motorized trails.
- **Pedestrians first on motorable roads**: every existing road must be retrofitted to include non-motorable lanes and easy and safe crossings for non-motorized traffickers (humans on foot, bicycles, animals); this must be mandatory for all roads. Existing roads should be made safer and completed (retrofitted, re-adjusted) with foot-paths, non-motorized lanes, safe crossings, and intermodal intersections.
- **New roads, better roads**: in building new and safer motorable roads, non-motorized lanes (for pedestrians, cyclists and animals) should be planned and designed right from the beginning. Priority must be accorded to pedestrians, animals and cyclists. Revisions may be necessary in terms of the legal liability of road builders, maintainers and drivers. Additional points should be added to the penal codes for cases of vehicle-caused death and injury to non-motorized movers; i.e. pedestrians, cyclists and animals.

- **Upgrade public motorized transportation**: strict enforcement of road safety and environmental rules, and training for public transport workers.
- **Proper management, regular maintenance and additional security measures**: for existing helipads, STOL (short take-off and landing) runways and flight routes; each airport/helipad must function as the starting point/terminal of motorized as well as non-motorized trails and roads.
- **Electric ropeways**: for goods (also for persons) wherever possible: each ropeway terminal should serve as the starting point/terminal of trails and roads.
- **Railroads**: eventually, Nepal will have to develop railways that connect with the Indian railway network in the south which already reaches Nepal's borders, and with China's railway network that is expanding in the Tibetan plateau. Rail connections with India and China could be immensely beneficial for Nepal's trade and tourism. Each railway station should be designed to serve as the starting point/terminal of motorized roads as well as non-motorized trails.

A multiform inter-modal mobility system, with high priority for non-motorized modes (pedestrian/bicycles/animals), is what Nepal needs to create affordable, cost-effective and ecologically sound transportation while reducing human (and animal) vulnerability. Human and animal-powered mobility has always been a salient feature (and a great tourist attraction) of the whole Himalayan region. It can and should be harmonized with new, better and safer modalities of motorized mobility. This is important not just for cutting fuel costs and controlling pollution, but also for developing Nepal's economy (local trade, trekking and tourism). This multi-form intermodal mobility is, above all, necessary for reducing the vulnerability of all living and sentient beings in Nepal.

7 Environmental vulnerability, energy supply and waste management

Post-earthquake Nepal is facing many socioeconomic challenges related to environmental degradation and climate uncertainties. To address the environmental vulnerability in Nepal, two major issues must be seriously dealt with: energy and waste.

In Nepal, energy demand has been outpacing supply for many years. Fuel shortages are frequent, and high cost is a constant problem.[12] Demand for fossil fuels and electrical energy for private homes, transportation, business/livelihood structures and public facilities in Nepal is growing exponentially. Due to this shortage and high costs, many self-employed workers and small entrepreneurs are struggling to run their businesses. They are vulnerable to economic downturns as well as to other hazards. The obvious response from Nepal's government to the ever-increasing energy demand is to develop more hydropower because Nepal is rich in water resources.[13] To deal with the current shortage and increasing future demand of energy, Nepal has stepped forward to implement big hydropower projects.

One particular dream is quite popular in Nepal: making a lucrative revenue by selling electricity to neighbors (mainly India) where massive industrial development and expanding consumerism have generated a huge demand for energy. The dream of selling surplus electricity to neighbouring countries by generating a lot of energy from big hydropower plants is not sustainable at all. Large hydropower projects demand huge financial investment that does not come easily, is never free of conditions and interference, and takes a long time to implement. Large hydropower facilities and power transmission grids are complex to manage and expensive to maintain. Bigger facilities imply more risks from natural hazards (earthquakes, floods, landslides …) and security threats (terrorism, sabotage). Big hydropower plants are invasive and are likely to alter local ecosystems. In the case that Nepal successfully harnessed electricity from big plants, it would be compelled to sell most of its surplus only to India or China (the two countries that encircle Nepal) on their own terms because there are not enough market options to sell electricity to a variety of buyers. Therefore, big hydropower projects aimed at producing surplus electricity do not make economic sense. It would be better to develop a multitude of locally manageable mini-grids and small-scale plants all over the country to satisfy local needs at affordable price. Nepal also needs to prioritize the use of renewables (rather solar than wind[14]) and human/animal power solutions (for walking, working, riding, and traction), combined with better management and operational efficiency through the entire energy supply chain. People's energy-deprivation and related vulnerability should be addressed through decentralization (micro/mini plantscatering to local needs) and de-massification (stand-alone solar panels). Energy de-massification and de-centralization make end-users more responsible, and empower local communities.

The cleanest unit of energy is the one which is not consumed. Deliberate rationalization to reduce energy demand is the best way of saving energy (and cost) and cutting pollution. Reducing energy demand can be achieved through improving lamps, installing efficient and smoke-free kitchen stoves, biogas plants in rural farming households with animals, proper insulation and ventilation of buildings, use of locally available natural building materials (e.g. limestone, hemp, wood, bamboo etc.) Walkability, bicycle lanes, animal-power, etc. can drastically reduce the demand for energy, particularly of highly polluting imported fossil fuels. A relentless drive to reduce energy demand is likely to trigger many improvements in eco-efficiency and a new wave of entrepreneurial activities. Practical training for the population to reduce energy demand should be an integral part of a civic environmental awareness campaign that uses all possible means: local community-based training sessions, media (print, radio, television) and web. Fiscal incentives for decreasing energy consumption should be made available to households, businesses and all private and public organizations. Demand reduction must be the main goal of Nepal's energy strategy. This will encourage economic savings and ecological innovation. Nepal will be lighter and leaner, greener and cleaner; and, above all, people and all other living beings will be less vulnerable. A deliberate and determined drive to contain and decrease "volume" (i.e., the cumulative quantity of energy that is produced) should be combined

with an equally strong drive to increase "value" (i.e. need satisfaction, reliability, cost-effectiveness). The de-coupling of "value" and "volume" is a strategic imperative for sustainable economic development everywhere, not only in Nepal.

Along with the issue of energy, waste is a critical issue for Nepal's environment. The 2015 Earthquake turned a lot of man-made structures into debris in Nepal's towns and villages, where non-biodegradable waste was already an increasing burden. The impact of waste is related to the pollution of soil, water and air; but also includes space consumption, bad smells and aesthetic degradation – detrimental to the environment, public health and tourism. Nepalese people are vulnerable to many risks related to the ever-increasing and accumulating volume of waste littered around and dumped at many sites, most of them unauthorized and carelessly managed.[15] Three decades ago, waste was not a problem because consumption and material flows were limited within the confines of a subsistence economy based on the resources available within a close range, mostly related to the primary sector (agriculture, livestock, forestry). Rural activities generated very little waste, which was almost entirely biodegradable, and that waste was re-distributed within a narrow area and dissipated into the environment (decomposition and re-cycling in Nature). In the past three decades, the situation has drastically changed. Non-biodegradable waste has increased enormously even in remote rural areas due to urbanization and urban-like consumerism with the steady circulation of industrial products, mostly imported from outside Nepal. Non-biodegradable waste is increasing everywhere in Nepal, including the high crests and peaks where leftovers from trekking and climbing expeditions are scattered.

There is an important sociocultural dimension to waste management in Nepal: the very low social status of waste-management workers. This is not only a legacy of the old caste mentality. It is more due to the negative perceptions of ordinary people all over the world (not only in Nepal) about any work that involves the handling of waste (filth, dirt, discarded materials). In Nepal, as in many parts of the so-called "Third World," ground-level waste-handlers are neither properly trained nor well paid. There are many informal waste-pickers who are self-employed and organized in small bands. Their working conditions are even worse. Inevitably, this creates low self-esteem among all waste handlers, with adverse effects on their morale and quality of work. For any society to be clean and healthy, waste handling must be among the well-paid jobs. Training programs and better pay would certainly help to raise the social profile of waste-handlers and make it easier for them to obtain better economic treatment. Improvements in the socioeconomic conditions of waste-handlers means reducing, first of all, the vulnerability of an already vulnerable and marginalized social category (i.e., waste-handlers). A reduction in their vulnerability would lead to a drastic reduction in the vulnerability of the entire community, which in turn would then be less exposed to health and environmental risks posed by waste.

Waste minimization should become the highest priority. Lessening demand and diminishing circulation implies an extended life-cyle for products, more re-use/re-cycling, better quality of environment, less burden (and cost) for waste management; and, above all, a reduction in the vulnerability of all living and sentient beings. The following list describes measures for waste minimization:

- Re-qualification of waste-handlers through selective recruitment, solid training and good remuneration as "workers with special skills", and "public officers" (i.e. environmental operators).
- Reduction of the length of supply chains for all commodities and products (towards "zero km").
- Increasing the durability of end-products, artificial plants and installations, infrastructures.
- Enhancing the versatility, re-use and recycling of materials and products already in circulation.
- Implementation of new fiscal measures (tax and incentives) for curbing waste.
- Enforcement of strict regulation on waste disposal.
- Increasing wealth creation through non-material and cultural resources (services, arts, literary and scientific productions, brand value ...).

8 Economic policy for vulnerability reduction and sustainable development

From the perspective of the conventional economy, which is obsessed with quantitative "growth," the macro-economic indicators of the past decade generally show slow and moderate growth in the gross domestic product (GDP)[16] of Nepal. As per Nepalese government sources (MF), GDP per capita is estimated to be around 853 US $ now; a slight increase on previous years. In the current fiscal year (FY 2017–2018), GDP is projected to increase robustly (around 6.94%) while inflation is expected to rise only modestly (around 3.4%); total government revenues are predicted to grow spectacularly (around 33%), while foreign loan and grants are liable to remain at the same level as the previous year.

The picture provided by international organizations is entirely different. According to the Asian Development Bank, the growth of Nepal's economy is slowing down to 4.7% in FY 2017–2018. This growth forecast has been revised down from an earlier estimate in the wake of severe floods and landslides that affected agricultural output (ADB 2017). According to the World Bank, economic growth is expected to slow down because of the contraction in agricultural output and exports, higher interest rates, inflation (between 5% and 9%) and a tightening of credit. Government expenditure is expected to rise further and widen the fiscal deficit, and the decrease in remittances is resulting in current account deficits. The growth of deposits has slowed faster than that of credits, resulting in the diminished ability of banks to lend to entrepreneurs (World Bank 2018).

For the last six decades, the general picture of Nepal has been that of a weak and backward country. As per the "multi-dimensional poverty index" (MPI)[17] Nepal *is* a backward and weak country, despite some noticeable growth in national output and government revenue. According to the estimates of Nepal's National Planning Commission (NPC 2018) and the United Nations Development Programme (UNDP/Nepal Office 2018), 28.6% of Nepal's total population[18] suffers deprivation, and Nepal's score on the Human Development Index (HDI) is very low – 144th among 188 countries. Outbound migration and the under-reporting of seasonal intra-regional migratory movements have falsified data about unemployment (officially around 3.2%). Under-employment, the informal ("black") job market and poor remuneration (i.e., exploitation) are widespread. The economic freedom needed for entrepreneurial activities is moderately below the regional average (Asia-Pacific), well below the global average, and far below the average enjoyed by entrepreneurs in developed countries.[19]

The revenue of the government in relation to GDP was around 21.45% in the recently concluded fiscal year (FY 2016–2017). Of all government revenues, 93.18% was from taxes; non-tax revenue was 6.82%. Revenue in previous FY (2015–2016) in relation to GDP was around 20.5% (tax revenue 18.4%, non-tax revenue 2.1%). In FY 2014–2015, it was 19.1% of GDP (tax 16.8, non-tax 2.4%). In 2013–2014, the FY preceding the earthquake, it was 18.2% of GDP (tax 15.9%, non-tax 2.2%). Since FY 2006–2007, when total revenue was 12.1% of GDP, the government's tax revenues have continued to increase (MF 2016a and 2017).

Public finance does not seem to be in very bad shape for now. But the national economy is lopsided (non-productive) and externally dependent (remittance, foreign aid); society is backward, and people are vulnerable. There is ample space for the Nepal government to adjust public finances in order to invest more into human vulnerability reduction as well as in human resource development (i.e. education/training, business incubators, support for entrepreneurial start-ups). This demands sustained financing from state coffers which should be continually replenished by revenues. A reduction in human vulnerability and enhanced human resources would lead to the widespread development of entrepreneurship and self-employment which, in turn, would lead to more private and corporate income, thus multiplying sources of tax revenue. In any case, initially, consistent financial investment is needed; this means an increase in government expenditure. Therefore, two sets of policy measures are necessary to make Nepal's post-disaster development financially viable and economically sustainable: **cuts** and **taxes**.

We suggest starting with the "cuts" by reducing drastically the perks and privileges of politicians[20] which are disproportionately costly for a poor and backward country like Nepal. Cuts should also be made to many ceremonies and celebrations.[21] Cuts in perks, privileges and ceremonies may not be quantitatively significant in terms of making savings from public finances, but they are certainly helpful in terms of resource efficiency and are politically and socially meaningful as a strong symbolic gesture of the moral

legitimacy of rulers and the system. The moral legitimacy of the political system is one of the fundamental requisites for sustainable development. For the moral legitimacy of a system to be sustained, downtrodden and common citizens should be protected and provided with the essentials they need to live well, and the highest echelons of the establishment of power should represent living examples of parsimony, sobriety and efficiency to lead effectively. Without the moral legitimacy of rulers and system, it is difficult for a government to lead; and it is hard to obtain compliance from citizens who struggle to live. When the moral legitimacy of rulers and system is in doubt then the private sector feels justified in dodging taxes, non-governmental organizations tend to be self-serving, corruption in public administration and in business management becomes rampant, common citizens suffer, and the economy languishes. Austerity is a very efficacious economic policy provided that it is applied first and foremost to rulers and elites.

There is a wide range of subsidies and discounts that Nepal government offers to organizations, sectors and companies. The government should periodically scrutinize all subsidies and concessions. The government should periodically make a balanced score-card for each subsidy or concession awarded to any person, firm or organization. Cuts in unproductive subsidies and unnecessary concessions may not quickly produce a big difference in the government coffers, but cumulatively and ultimately, they become incisive for rationalizing the system and allocating resources where they are worth allocating.

Every year, an independent, critical "spending review" of all expenditure should be published in order to single out potential areas in which to apply cuts. The spending review should set out where and how government money can be saved from expenditures that are morally untenable (disproportionate perks and privileges), superfluous (non-essential, like pompous ceremonies), or socioeconomically unproductive (certain subsidies). Once singled out, the public must be informed about the results of the spending review, and the cuts must be executed quickly. The cuts will certainly help with saving, with re-deploying resources productively, and with creating the moral ground and social consensus on which the government can impose taxes.

Nepal's government should work towards building a broad formal tax base (Pyakurel *et al*. 2013; SLRC 2016). Nepal does not tax citizens a lot, but it delivers too little. It should tax a little more, but must deliver a lot better. Taxation must be limited and well-targeted, based on socioeconomic goals.[22] A steady stream of tax revenue is needed now and in the future to reduce the vulnerability of Nepalese people and for human capital development (i.e. health, education, skills, training, capacity building, business incubators, support for entrepreneurial start-ups). While the expenses of vulnerability reduction and human capital development justify some increases in tax, there may also be some areas where the decrease or elimination of tax is beneficial to people. Taxes on business and labour inhibit the entrepreneurial spirit and work ethic. Progressive taxation

on corporate profit and private income is justified. It is acceptable to tax heavily various forms of speculative investments (stock market gains, capital gains, currency trades, etc.). It is also acceptable to tax non-productive forms of earning such as rent, inheritance, discounts, commissions, etc. as well as certain forms of consumption.

Value Added Tax (VAT) is a general consumption tax and is added to goods at each step of the production and distribution process. VAT was introduced in Nepal in 1997. The current general rate is 13%. Some items such as agricultural items and inputs, medical supplies, educational materials, literary and cultural items, public transport for passengers, etc. are exempt. Nepal should review its VAT policy in the light of domestic needs. The VAT situation is different from country to country. VAT is the most commonly applied consumption tax in the world (applied in more than 160 countries). Leaving aside exemptions and reductions, according to the socioeconomic policy goals of each country, the global average general VAT rate is around 15.80% (KPMG 2015). Nepal's general VAT rate is quite low (13%). It could be raised a little higher, to a general rate of 16%. This would help public finance and would allow government spending on welfare, human vulnerability reduction, environmental protection, human capital development through education, public awareness campaigns, capacity-building, entrepreneurship-facilitating services (training, business incubators, cheap credit, market info), etc. Some more items should be included on the list for exemption or rebate; for example: medical and educational supplies, the building materials produced in Nepal that include components of Nepalese origin, technical instruments and essential items related to land safety, clean water supply, pollution control, wireless telecommunications and internet services, renewable and clean energy, waste management, etc. The government can continue adjusting VAT exemptions and rebates for specific items or sectors in order to improve sustainability, to cool an overheating business sector, or to boost an ailing one. In the long term, the general VAT rate should be stable and well within the tolerable range (between 15% and 18%) in order to prevent the expansion of a VAT-dodging, under-ground ("black") economy.

Nepal needs to introduce "extended producer liability"[23] to tax all product's end-of-life phase because that phase creates environmental and public health burden and waste management cost. It is designed to offset the environmental cost of goods. It is incorporated into the price of products by making the manufacturer of the product responsible for the entire lifecycle including the post-consumption (after-use/end-state) phase for take-back, recycling and final disposal. In Western Europe[24] many countries have adopted some form of such targeted taxation, either directly as a pre-tax fee paid by companies to the specific consortia that handle the post-consumption (end-of-life) phase of that specific product, or as a part of direct tax, or a mixture of both. This concept was first introduced in Sweden in 1990. Later, the European Union issued a waste directive mandating all member states to recycle non-biodegradable waste and use fiscal and regulatory means to make this happen. In the case of Nepal, the extent of such a tax should be proportionally correlated to the volume of waste generated by a product and its

packaging material, with the risks (hazardous/non-hazardous) incurred by the after-use phase, with the environmental burden (biodegradable/non-biodegradable), and with the cost of waste handling and final safe disposal.

In the case of products imported from other countries (i.e. most of the consumer products in Nepal), there should be an "extended importer/trader liability" tax for products as well as for packaging materials whose end-of-life/after-use ultimately becomes a burden to society, the environment and public finances (i.e. the cost of waste management). Imposing an outright ban on non-biodegradable materials without some viable alternative makes little sense. The former would be unenforceable, thus would only create illegal traffic and unauthorized dumping. It is better to vigorously tax non-biodegradable materials right at the beginning of their entry into the socioeconomic cycle in order to prevent waste. The tax collected by extended producer and trader liability should be invested in the research and development of locally available biodegradable substitutes and used to provide an incentive to local entrepreneurs who produce items from locally available biodegradable materials and re-use and recycle materials already in circulation.

In addition, substantial taxation should be imposed on items associated with an unhealthy lifestyle such as drugs, tobacco, alcohol, junk food, and drinks. Since 2016, the United Kingdom has imposed an extra tax burden on sugar-containing bottled and canned drinks. In response to growing concerns over obesity, UK imposed a levy on soft drinks like Coca Cola, Pepsi Cola, Red Bull, 7Up, etc.[25] Many other countries are either already implementing or seriously considering similar options for a variety of unhealthy items.

After imposing fiscal pressure on unhealthy items, on the end-of-life/after-use stage of all products, and on non-biodegradable materials, the cost will be very high for certain types of industrial products. A hefty tax on non-biodegradable and unhealthy items, containers and packaging will generate noticeable costs for producers and importers. Producers and importers will discharge the accumulated tax pressure down to retailers and consumers in order to maintain their profit margins. Ultimately, end-consumers will have to pay more. This will discourage the consumption of certain products. Less non-biodegradable materials in circulation means a reduction in the waste management burden. Less consumption of junk foods/drinks means a positive gain for people's health and purses. Less importation will stimulate local entrepreneurship and improve the trade balance. The demand for local biodegradable substitutes will certainly increase. Local producers may venture into the production and trade of local alternatives that are less exposed to taxation (i.e. environment-friendly, healthy, biodegradable). Harnessing domestic resources through such progressive taxation for local development is far better than depending on foreign aid (loans and grants).

After the 2015 earthquake, foreign governments and international organizations pledged (but have not effectively delivered) a little more than four billion US$ to help Nepal – nearly half of the entire total estimate of aid required for the five-year period of

rehabilitation and reconstruction. Aid from foreign governments and from international institutions is called "Official Development Assistance" (ODA). In Nepal ODA is spent on infrastructure, drinking water, health, education, energy, agriculture, and also for "peace and rehabilitation" projects after the end of Maoist insurgency. ODA comes to Nepal in different forms (outright grants, commodities or cash or specific services, soft loans, disbursements for ongoing or completed projects, direct payments to providers such as NGOs or firms, etc.). Foreign aid is used to support development programs, national budgets, and for humanitarian assistance. Nepal also receives direct help from large international non-governmental organizations (INGOs). The combination of all foreign grants, loans and contribution has represented on average one-fifth of the national budget over the last decade.

Nepal has been receiving foreign aid and "advice" for the past six decades. Six decades of such foreign aid and advice have not produced better governance in Nepal. The country remains one of the poorest, worst governed,[26] and perceived as one of the most corrupt[27] in the world, All this seems to suggest that foreign aid to Nepal is ineffective, misused or wasted. Serious doubts have been raised by scholars and observers, both Nepalese and foreigners, about foreign aid to Nepal, from early periods until recent times (Mihaly 1965; Pyakuryal *et al*. 2008; Panday 2011). Frequently, observers question foreign donors' terms, conditions and "advice" (interference in internal affairs). More questions are being raised about many unintended consequences (e.g. corruption, the rise of a foreign-connected new professional elite, rent-seekers, too many aid-seeking NGOs, proselytism for converting locals to followers of alien religions, distortion of market, inflation, aid-dependency, loss of national prestige, etc.). Foreign aid is a very controversial issue in Nepal; but not only in Nepal.

Ultimately, reliance on foreign aid is not a definitive solution for any country. A country that is dependent on foreign aid will never be free of foreign interference in its internal affairs, and will never be held high in the opinions of its own people nor in global public opinion. Now, starting from the efforts related to post-earthquake reconstruction, Nepal's economic goal should be to pay back its foreign debt and phase out dependency on foreign aid. Nepal should build a self-reliant and debt-free economy based on sound public finances, targeted taxation, government efficiency and, above all, private sector productivity and expansion (local entrepreneurship-driven development). The best form of foreign aid that Nepal needs, and which can be highly effective, is that of selected and essential technical help: experts, trainers and essential equipment from abroad.

9 Concluding remarks: a little note from the past, an important lesson for the future

After the big earthquake of 1934, which killed more than 12000 and destroyed most of Kathmandu valley's houses and infrastructures, Nepal's rulers of that period (hereditary monarchy, regents and coteries, none democratically elected), politely declined the

generous offers of financial help for reconstruction by the global super-power of that time (i.e. the British empire, present as colonial administrator in neighbouring India). But the Nepalese rulers were successful at mobilizing and managing internal resources, helping the needy, punishing the greedy, and in re-building better. In the aftermath of the 1934 earthquake, free donations from individuals and charities from outside Nepal (mostly from India, Britain and Japan) were accepted only for immediate emergency relief. Not a single penny was accepted for reconstruction. Reconstruction was done entirely by harnessing internal resources (Sharma 1951). It is also noteworthy that, in the end of a seven years-long recovery and reconstruction process, loans provided by government to commoners for rebuilding their family shelters were totally pardoned (Shamsher [1936] 2015). Is it not possible for today's democratically elected Nepalese rulers to do something similar (or better) now, instead of begging for money from foreign donors and delaying the reconstruction process?

Notes:

[1] After a two-decade hiatus, local (municipal and regional) elections were held in Nepal in three phases on 14 May, 28 June and 18 September 2017. These were the first local-level elections to be held since the promulgation of the new 2015 constitution. The previous local elections were held in February 2006 under the old monarchical constitution, which were boycotted by the major political parties, and saw low voter turnout. Prior to 2006, local elections were held in 1997. Elections were supposed to be held in 2002 but were delayed due to decade-long (1996–2006) violent political turmoil caused by the so-called "people's war" launched by the Maoist communist party of Nepal.

[2] Sindhupalchok, one of the mountain districts worst affected by the earthquake (one of our field survey sites), is a case in point; out of 68 municipal bodies known as "Village Development Committees" (VDC), as many as 25 VDC offices were without secretaries when the disaster happened.

[3] In less than three years following its formation, the chief executive officer and members of the executive board of the National Reconstruction Authority (NRA) were changed four times following changes in the government coalition and due to the political bargaining among the coalition partners.

[4] It appears that, since 2006, more than four million able-bodied Nepali citizens have left the country to work abroad. According to Nepal's government foreign employment regulatory offices, each year around half-a-million Nepalese citizens legally go abroad for work. There are no estimates about those who have left illegally (through human-trafficking channels).

[5] World Development Indicators from the World Bank, gross domestic product (GDP) per capita based on purchasing power parity (PPP); data last updated on 01/03/18.

[6] Nepal's new constitution came into effect on Sept 20, 2015, replacing the interim constitution of 2007 which, in turn, was established after the abolition of the monarchy. According to the new constitution, Nepal is composed of seven large administrative regions which are supposed to be responsible for local development, some fiscal policy matters, environmental measures and social provisions.

[7] Source and license: https://commons.wikimedia.org/wiki/File:Nepal_adm_location_map.svg (15 March, 2019).

[8] *Pipal* or *Peepul* (*Ficus religiosa*) is a species of semi-evergreen fig tree with a very long lifespan.

[9] Their remains are found in many parts of the Indian subcontinent and Himalayan region where they are known as *Gadh*, *Gadhi* or *Kot*. Such public structures were also common in Europe during the Middle Ages. Many medieval European villages and towns were developed around a central fortified structure (*Receptum* in Latin) which served as a temporary retreat to protect the population in times of insecurity and emergency. Usually, the fortified citadels (*Ricetto* o *città murata* in Italy, *Kremlin* in Russia, *château* in France, similar structures all over Europe) contained the governor's residence, a military post, market square, chapel, lodging and storage facilities. *Receptum* also served as the places in which to deposit the treasures of the community, venues for gatherings of public interest and celebrations, and as the site of local government. The best preserved example of a large *receptum* in Western Europe is to be found in Candelo (*Ricetto di Candelo*, built in the 11th century A.D.) in the province of Biella in the region of Piedmont, north-western Italy.

[10] "Road accidents are the leading cause of death of young adults between 18–29 years of age. Those getting killed are therefore often the able-bodied, the best of the workforce, and often the breadwinners for their family," (c.f. *Nepali Times*, 26 July–1 August, 2013).

[11] "Walkability" is a measure of how safe and easy an area is for a pedestrian. Walkability means that the public space and built environment are benevolent to the presence of people living, working, doing their necessary tasks, going to school, shopping, visiting, enjoying or spending time in any area – on foot. Walkability decreases human vulnerability; it encourages safe and free movement of individuals and groups, social interaction and the getting-together of friends and relatives. Walkability provides the much-needed "eyes on the street" that reduce petty crime because more people walking around means more eyes watching over neighborhoods and streets. Walkability has become an important concept in land-use and environmental planning. Factors influencing walkability include the quantity and quality of sidewalks and walking lanes, pedestrian rights-of-way, land use patterns and, above all, a drastic decrease in the volume and pressure of motorized traffic. Automobile-focused street design and town planning are detrimental to walkability. In Asian cities, only areas of interest to tourists are walkable to some (limited) extent; the case of Nepal is one of the worst in Asia (Leather *et al.* 2011).

[12] According to a projection from the Nepal Electricity Authority (NEA), demand will triple in the next decade, reaching 3,600MW by 2027. Nepal's installed hydropower capacity is around 800 MW. Electricity demand has already exceeded 1300MW. According to the latest official estimates, fossil fuels are used mostly for transportation, while firewood still contributes more than 75% of household energy needs (in rural areas, perhaps 99%); fossil fuels account for more than 8% of domestic needs, electricity for only 2%, and solar around 0.5% (Water and Energy Commission Secretariat, Government of Nepal, 2015).

[13] Nepal is rich in water resources: glaciers, snow-melt, rainfall, falls and springs, surface and underground water. There are more than 5000 rivers, including rivulets and tributaries, totaling about 45000 km in length. Moreover, there are hundreds of lakes and thousands of natural ponds of various sizes. Nepal contains 2.2% of the world's inland water resources. This is significant considering that the country is a relatively tiny, landlocked spot on the world map. Nepal's potential capacity for producing energy from hydropower projects is estimated to be above 80000 MW.

[14] Nepal's geophysical characteristics (between 30.43° and 26.36° latitude north of the Equator, elevated position) and climatic conditions (around 300 days of sunshine annually) create highly suitable conditions for harnessing solar energy for heating as well as for electricity generation. Solar and photovoltaic (PV) plants do not pollute the air; they can be added or fitted into existing structures (usually on rooftops) without occupying extra space and without being visually invasive.

Covering natural spaces and green fields with solar/PV must (and can) be avoided; solar/PV should be fitted onto the built structures without eroding virgin surfaces. In contrast, wind power turbines have a significant impact. A large number of turbines and supporting structures and a lot of materials and artifacts are needed to harness energy from wind. Such invasive structures can have a degrading effect on landscape quality (landscape is Nepal's main resource for tourism). The availability of wind is irregular and uneven from place to place, and highly unpredictable. Wind power facilities (turbines) interfere with the normal movement of birds and insects (e.g. honeybees, butterflies, glow-worms …) directly, and as act as physical barriers indirectly though disturbances in bioacoustics and vibrations. It may be possible to harness energy from small individual turbines in the form of power co-generators by using a "stand-alone" (off-grid) system in some windy places (e.g. northwestern high mountain districts). In general, for the public grid and on a medium-large scale, this solution is not suitable for Nepal.

[15] Nepal's waste management needs survey submitted to the "Global Partnership on Waste Management". The United Nations Environment Programme (GPWM/UNEP) and the Nepal-based NGO Society for Environment and Economic Development (SEED) suggests that Nepal's waste management is very inefficient and, above all, the country needs to address the problem of specific and potentially hazardous wastes such as industrial and non-biodegradable waste, healthcare waste (used and discarded bio-medical items) and e-waste (electronic and electrical trash). In Nepal, potentially hazardous wastes are often discharged carelessly, or disposed alongside general municipal waste, or informally recycled with little attention to health and environment (UNEP 2019; available at: http://www.unep.org/gpwm/InformationPlatform/org/gpwm/CountryNeedsAssessmentAnalysis/Nepal/tabid/106535/ (15 March, 2019).

[16] For the fiscal year (FY) 2015–2016, Nepal's real GDP at basic prices (adjusted with inflation) was estimated to be around NPR 6 952 billion (around 66 billion US$, provisional estimate, first semester of current FY), with an annual inflation rate of around 9–10%. The annual average percentage change of real GDP at basic prices has swung between 2.8% in FY 2006–2007 to 5.7% in FY 2013–2014. A sharp decline occurred in fiscal year 2014–2015 (2.3%) and in FY 2015–2016 (0.77%), certainly due to the economic slowdown following the earthquake, unrest in the southern lowlands, and the Nepal-India border blockade between late 2015 and early-2016. Per capita GDP was 410 US Dollars in FY 2006–2007; it reached 762 US$ in FY 2014–2015 and was expected to decline slightly (752 US$) in FY 2015–2016. Nepal's moderate increase in GDP has not been well distributed; the rich-poor gap remains a serious problem.

[17] The global "Multi-dimensional Poverty Index" (MPI) was developed by Alkire and Santos (2010; see also Alkire *et al.* 2015) and first appeared in the UNDP's 2010 Human Development Report. The MPI takes into account three dimensions of deprivation: health, education, and living standard. In each of the three dimensions several specific indicators (e.g. households with running water or proper roofing and flooring) can be included as per the local context. The Sustainable Development Goals (SDG) promoted by UN recognize and seek to end poverty in all its forms and dimensions. The multidimensional concept of poverty is now embedded in the SDGs.

[18] The total population of Nepal is 29 million.

[19] According to the Heritage Foundation's calculations, Nepal's economic freedom score is 54.1, making its economy 133rd out of 180, putting it among the "mostly unfree" countries. The "Economic Freedom Index" is calculated by taking into account judicial effectiveness, property rights, monetary freedom and labor freedom.

[20] "… Former dignitaries, including heads of state, prime ministers, ministers, chiefs of commissions and security bodies, justices and secretaries are using excessive … facilities worth millions of rupees from taxpayers' money", stated the sub-panel of a parliamentary committee after

nearly three months of study. The sub-panel was headed by parliament member Janak Raj Joshi. … "Rented or government residences, deployment of personal and residence security and other facilities such as vehicles, drivers, fuel, maintenance, secretariat, staff, helpers and medical facilities are the types of conveniences provided to former dignitaries. In Nepal there are 8 former prime ministers, 9 former deputy prime ministers, 11 former chief justices and 17 former home ministers using the facilities," stated the report. "The state has to bear from Nepalese Rupees [sic] (NPR) 3.6 million to NPR 4 million every year just for one former high-ranking dignitary …" (see Prakash Acharya, "Security, facilities for former VIPs unjustifiable: House panel" in the Himalayan times, daily, Kathmandu, Nepal, 21st June 2016).

[21] Every time Nepal's head of state (president) or government (prime minister) travels abroad on an official visit, a big, colourful ceremony is organized with five virgins (*Pancha-Kanya*), decorations and garlands, guard of honour and so on at the airport to see-off and to welcome back; this is unnecessary, expensive, even ridiculous.

[22] From reading the 253-page-long report of Nepal's tax advisory committee (Rajaswa Paramarsha Samiti-ko Prativedan 2067, Ministry of Finance, Government of Nepal (2010)), we get the impression that there are enough details but not enough clarity about economic and social policy goals for targeted taxation.

[23] According to the Organization for Economic Co-operation and Development (OECD 2019), "Extended Producer Responsibility" places a significant responsibility – financial and physical – for products' post-consumption phase. Assigning such responsibility could in principle provide incentives to prevent wastes at the source, promote product design for the environment and support the achievement of public recycling and materials management goals. Within the OECD the trend is towards the extension of EPR to new products, product groups and waste streams such as electrical appliances and electronics Available at: http://www.oecd.org/env/tools-evaluation/extendedproducerresponsibility.htm (15 March, 2019).

[24] In Germany, after the adoption of "extended producer liability", between 1991 and 1998, per capita consumption of packaging material was said to have come down from 94.7 kg to 82 kg. In the USA, 40 such laws have been enacted in various states since 2008 and the results are positive. *Auto Recycling Nederland* (ARN) is a producer liability organization that makes arrangements for vehicle component recycling charging an advanced recycling fee to those who purchase a new vehicle; that fee is used to fund recycling. *Consorzio Nazionale per la Raccolta, il Riciclaggio ed il Recupero degli Imballaggi in Plastica* (COREPLA) in Italy is a mandatory consortium for companies that produce plastic materials; it was established to charge producers a fee and to handle collection, recycling and re-utilization. There are similar mandatory consortia for other non-biodegradable wastes across Europe. Outside the EU, other western countries such as Norway, Iceland and Switzerland have also adopted similar measures. The Swiss Association for Information, Communication and Organizational Technology (SWICO), an ICT industry organization, addresses the problem of electronic waste.

[25] In the UK there is a so-called "sugar tax" on bottled and canned drinks with more than 5g of sugar per 100ml. There is also a higher rate for those with more than 8g per 100ml. Natural fruit juice and milk-based drinks are exempt. The measure will raise an estimated 520 million pounds (around 673 million US$) a year, and will be spent on doubling funding for sports facilities in primary schools of Britain.

[26] The 'Bertelsmann Transformation Index' (BTI) prepared by Bertelsmann Stiftung (an international NGO dedicated to research and documentation on socio-economic and political transformation in the world, based in Germany), a governance assessment tool covering 129 countries, rates Nepal as very low (around 3 on a 1-10 scale) in the "resource efficiency" (effective use of available resources) and "steering capability" (political leadership and strategic

coordination) criteria. According to BTI, Nepal clearly lacks a coordinated long-term approach for economic development.

[27] According to Transparency International's Corruption Perception Index, Nepal is located in 122nd position among 180 countries surveyed in 2017. Available at: https://www.transparency.org/news/feature/corruption_perceptions_index_2017 (15 March, 2019).

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