Botanical aspects of eco-civilisation construction

Alan Hamilton, Shengji Pei, Lixin Yang

1. Eco-civilisation

The world considered as an ecosystem is becoming destabilised by human activities, as demonstrated by climate change and ocean acidification (Stocker et al., 2014). A sixth great mass extinction event may have begun (McCallum, 2015). Tropical forests are being reduced (Baccini et al., 2012), deserts are spreading, large quantities of soil are being eroded, oceanic ecosystems are being polluted by industrially-generated iron fertilisation (Lin et al., 2015) and the lives of many people are being blighted by problematic access to food, water or fuel. Armed conflicts and cases of unsolicited or forced migration can often be interpreted as due, at least in part, to conflicts over scarce resources or triggered by environmental degradation (Kelley et al., 2015; Wendle, 2016). The scale of human impact on biogeochemical systems has become so great that some geologists propose recognition of a new geological period to cover the modern time of great human influence, the Anthropocene (Smith and Zeder, 2013).

The concept of eco-civilisation provides a vision of a future state of harmony between people and nature — a target for attainment. It was incorporated into the Charter of the Communist Party of China (CPC) at its 18th National Congress in 2012, moving it to the forefront of China’s national development strategy. Hu Jintao, then leader of China, explained: “…the essence of the construction of ecological civilisation is building a resource-saving and environmentally friendly society based on the environmental carrying capacity of resources, the laws of nature and sustainable development…” (The Climate Group, 2014). For the environmentalist, the concept of eco-civilisation is one relevant to everywhere, not just China. Its adoption by China is especially welcome, given the country’s large size and global influence, and because China has an exceptional record of turning radical policies into practice (for example the One
Child Policy launched in 1978–1980). China with its eco-civilisation policy has the potential to become a model for the rest of the world.

2. Plants play such fundamental roles in the functioning of ecosystems and economies that due attention must be given to them for eco-civilisation to be achieved. As photosynthetic organisms, plants provide the organic molecules on which animals feed and produce the oxygen required by most life. As living things attached to place, plants provide the main structural elements of terrestrial ecosystems, hold the soil together and, on decay, replenish soil fertility. Numerous products are obtained from plants, including food, construction materials, fuel, fibre and medicines. Also, plants form a major part of the sentient environments in which people enact the dramas of their lives. Aspects of the plant world—for instance, perhaps particular specimens of trees, or types of flowers, vegetation or landscapes—can come to hold special significance for people through their lifetime experiences, as mediated through the prisms of culture.

Taking a long term view—a relevant planning horizon to consider in this case, we regard the single most important botanical task in eco-civilisation construction is the conservation of plant species with their genetic diversity. Species are the basic functional units of the plant world, those existing today being the products of evolutionary processes extending back hundreds of millions of years (Table 1). They can be considered a legacy from the past to the present, essentially non-renewable if viewed as natural capital (Constanza et al., 1997; WFPN, 2016).

3. Extent of threats to plant species

Despite the great importance of plant biodiversity to the future of humanity, it is alarming that already about 20% of the ca. 300,000 plant species now on earth are in danger of extinction, overwhelmingly at the hand of man (Kew, 2012). Another indicator of the problem is that an estimated 75% of the genetic diversity of agricultural crops was lost during the 20th Century (FAO, 1992; FAO, 1998; Hawkes et al., 2001).

We refer to two countries to illustrate the extent of threats to plant diversity, one of its financially poorest (Uganda) and one of its richest (UK). A review has highlighted the challenges faced by plant conservationists in Uganda (Hamilton et al., 2016). Threats to plant diversity include a very high rate of loss of tropical forest, loss or degradation of numerous protected areas, and difficulties in maintaining germplasm collections of crops.

In the case of the UK, inadequate support for conservation of biological diversity (in general) is apparent in the declines in population size over the last 50 years of 60% of the 3148 species of plants and animals for which quantitative assessments of population trends exist; 31% have declined strongly (Hayhow et al., 2016; RSPB, 2013). Plant conservation is of much less interest to the general public than birds, judging by the relative sizes of the membership of Plantlife International (about 10,000 members) and the Royal Society for the Protection of Birds (about 1,000,000 members) (Avery, 2012). Even the Royal Botanic Gardens, Kew, an institution of the highest rank as a resource centre for international plant conservation, has failed to obtain adequate and consistent governmental support (Commons Select Committee, 2015; Sample and Bell, 2014; UK Plant Science, 2014). Culturally, the foundation for practical involvement in biological conservation seems set to decline. Children play much less outdoors than they used to, younger people tend not to join natural history societies and ‘whole plant botany’ has become a dying subject in schools and universities (Hindson and Carter, 2012; Natural England 2016; UK Plant Science, 2014).

4. An expanded agenda suggested for plant conservationists

Standard procedures adopted over the last 60 years to conserve plant species include the stepwise processes of taxonomic recognition of species, assessments of their degrees of endangerment and putting into place in situ and/or ex situ conservation measures as possible and appropriate (Given, 1994; IUCN, 2012). The main in situ tool has been the protected area. Places especially important for the conservation of plant species have been mapped (Anderson, 2002; Davis et al. 1994–1995), as too have centres of origin or diversity for traditional varieties of crops (Brush, 1999; Dvorak et al., 2011; Harris, 1990; Vavilov, 1926). Scientists concerned with plant genetic resources concentrated at first on conserving the landraces of a few major crops, especially using ex situ measures (seed banks and field collections), but subsequently have given more attention to in situ measures, wild crop relatives, minor agricultural crops and other uses of plants additional to food (FAO, 1992; Hawkes et al., 2001; Maxted et al., 2016).

Standard procedures for conservation of plant diversity have met with only limited success. We conclude that plant conservationists need social allies to boost their efforts—referring to elements of society whose primary interests in eco-civilisation construction are different, but whose efforts, if successful, will bring benefits to plant conservation too. Elsewhere, this expanded approach has been termed ecosystem-based plant conservation (EBPC) (Hamilton, 2007; Hamilton et al., 2012). Standard procedures still apply, but with more consideration given to who should be involved (not just to what needs to be done), taking into account the long-term sustainability of all ecological systems in which plants are significant components, and promoting conservation across the landscape. EBPC is a place-centred, not taxonomically-centred, approach.

We consider that the key people to drive this expanded agenda forward are those interested in conservation of plant diversity, given their dual interests in plants and conservation. Depending on their situations, not all need be experts on Red Listed species—if this was a universal requirement, then there would be very few plant conservationists available to catalyse the work in many parts of the world. Some of the many types of social players that can potentially contribute are indicated on Table 2 (listed in the cells after the symbol $). They include conservation-minded farmers, farmers concerned about the availability of water resources, teachers, religious leaders, and many others. Researchers have major roles to play in distributing practical information for the use of such parties appropriate to their roles. For instance, farmers and those managing water catchments could benefit from advice on how best to pursue their tasks in ways that benefit plant...
conservation, while teachers and religious leaders could benefit from advice on educational techniques useful for promoting learning about plants, as well as patterns of behaviour favourable to conservation.

Significant elements of EBPC thinking already penetrate some plant conservation plans and programmes. For instance, the major changes to the distributions of species, vegetation types and agricultural zones predicted with anthropogenic climate change have created a greater awareness of the need to think about conservation of plant diversity across the landscape and in a more dynamic way than has classically been the case (Araújo and Rahbek, 2006; Gitay et al., 2002; Hannah et al., 2002).

5. Suggested principles of ecosystem-based plant conservation

Some points made here are illustrated on Table 2, which gives a matrix indicating conditions favouring the delivery of ecosystem services together with conservation of plant diversity.

1. Acknowledge the need for geographically-based biocultural linkage

Both plant diversity and the delivery of plant-related ecosystem services are geographically related. It is therefore helpful if there are people associated with localities of interest who are knowledgeable about their plants. Long-standing residents, especially those closely dependent on local natural resources, typically accumulate much knowledge about local plants (including their types, uses, values and methods of management), thus providing exceptional foundations of expertise and interest upon which modern conservation solutions can be built. It is common for them to possess beliefs and related customs that are supportive of plant conservation (Pei, 2010; Pei et al., 2009b; Verschuuren et al., 2010). Where little in the way of long-standing indigenous knowledge survives, then other types of detailed interest in local plants must substitute.

2. Place local relationships between people and plants at the heart of analyses to determine how to proceed...
The locality is where plants grow and where people come into contact with them directly. This is where efforts made for plant conservation must succeed if they are to be counted a success (Hamilton and Hamilton, 2006; Pei et al., 2009a). Actions taken in wider socio-economic, political or cultural systems aimed at conservation – for example, new laws, revised Lists of threatened species, or the selling of carbon credits to ethically-minded consumers – must feed down to improvements at the locality level to be of any practical value. This point is reflected in the vertical division of Table 2 separating ‘conditions at locality’ and ‘wider systems influencing locality’.

Plant conservationists will benefit from establishing good overall pictures of local people/plant relationships for their localities of concern. Care may be needed to guard against biases related to their cultural backgrounds. One potential source of bias stems from the division that exists within the professional plant conservation community between institutions and programmes concerned with conservation of wild plant species and those concerned with plant genetic resources (Maxed et al., 2016). Another potential source of bias stems from the ways in which the plant sciences are divided into the specialities of botany, agriculture, forestry and horticulture (Hamilton et al., 2003). Constrained thinking on the part of plant conservationists may impose artificial limitations when analysing local systems of management and use of plants, which in actuality can refer to a variety of different types of vegetation and ways of managing plants.4

3. Adopt an ecosystem services framework to identify potential social partners

Ecological services are “the benefits provided by ecosystems that contribute to making life both possible and worth living” (NEA, 2016). Four categories of ecosystem services are normally recognised – provisioning, regulating, cultural and supporting (reflected in the horizontal divisions of Table 2) (Alcamo and Bennett, 2003). It is suggested that plant conservationists undertake analyses to determine relationships between local plant diversity and the delivery of ecosystem services, followed by the identification of the social players

4 The distinction between wild and other types of plants is often not easy to make. ‘Wild’ can variously mean not owned, not domesticated or not managed. The degree of precision defining ownership of land or plant resources can vary greatly between countries and sites, both legally and in practice. Many populations of plants seen as wild have been influenced in their genetic constitutions by human activities, while the intensity with which plants are managed is very variable, ranging along a spectrum from single specimens of plants that are intensively managed to plants that receive, along with their habitats, no management interventions at all.

Table 2

| Ecosystem Services (categories and examples of sub-categories) | Conditions favouring the delivery of ecosystem services together with conservation of plant diversity | Conditions at locality | Wider systems influencing locality |
|---------------------------------------------------------------|---------------------------------------------------------------------------------------------------|------------------------|----------------------------------|
| Provisioning Biomedical products                              | Land used for production managed in ways that maintain plant diversity. Emphasis on retention of endemic species and traditional cultivars in the landscape as a whole. S: Landowners, managers of land and plants, collectors of produce from wild plants, local representatives of line agencies | Products favoured that are produced in ways supportive of plant conservation. S: Traders, manufacturers, consumers, product certifiers | |
| Fresh water                                                  | Landscape managed to maintain vegetation types or forms of land use that deliver these services together with plant diversity. S: As above, plus direct beneficiaries of these services | Policies, international conventions, regional agreements and national laws that promote delivery of these services together with plant conservation. S: Governance systems, and relevant commercial and non-governmental organisations and networks | |
| Regulation of water flows, erosion and climate               | Diversity of plant species maintained in production areas and across the landscape, especially those known to deliver these services. S: As above | |
| Pest regulation and pollination                             | Child-raising practices and formal educational experiences favour acquisition of knowledge, skills and attitudes favourable to plant conservation. Information relevant to plant conservation available. S: Family, teachers and trainers, information providers | Policies, international conventions and laws relating to child-raising and educational curricula that are supportive of plant conservation. S: Organisations concerned with child-raising. Educational and information systems | |
| Child-raising, education and information                      | Worldviews, beliefs and ideologies favourable to plant conservation represented locally. S: Local cultural, religious and ideological leaders | Belief systems supportive of plant conservation. S: Cultural, religious and ideological leaders | |
| Cultural Worldviews, religions and ideologies                | Sectoral interests that favour plant conservation represented. S: Hobbits and communities activists concerned with plants or related ecosystem services. Aesthetes, artists and craft-makers culturally connected with local plants | Organisations and networks concerned with sectoral interests supportive of plant conservation. S: Cultural leaders, policy makers, programme managers, researchers | |
| Supporting Primary production                                | These services are supportive of maintaining natural capital. They underlie the more tangible services provided by provisioning, regulating and cultural services | |
associated with them, thus opening up the possibility of forging alliances for mutual benefit. Different aspects of the plant world can be of interest to different potential partners. For example, some may be interested in particular species (e.g. used for particular medical treatments), groups of plants (e.g. those contributing to pollinating systems that benefit crops), certain types of vegetation (e.g. those that help to regulate flooding) or forms of landscape (e.g. the concept of wilderness is culturally resonant in the USA) (Schama, 1995).

Ecosystem services can vary in their intensity of interest to communities. Those with greatest potential as motivators for plant conservation are likely to be those associated with benefits that are more immediate and socially resonant. For instance, this can sometimes be the case with medicinal plants (see Ludian example later).

4. Adopt an evidence-based approach to recognition of best practice

The complexity of ecosystems can make it difficult to know how to influence them effectively to meet particular goals. We suggest that an evidence-based approach is useful in plant conservation (Hamilton, 2011; Hamilton et al., 2012), just as it has proved in healthcare — similarly a science-influenced art dealing with complex systems with practical results required (Sackett et al., 1996). An evidence-based approach involves periodic reviews of the evidence relating to success or failure in dealing with practical issues, followed by the formulation of recommendations on best practice. These recommendations can then be disseminated for wider application, or treated as hypotheses for further testing. Both quantitative and qualitative methods can be used to judge success, as suitable for the case. The project described below was one of a suite of activities providing evidence for an analysis to determine best practices in plant conservation related to the interest of communities in medicinal plants (Hamilton, 2008; Pei et al., 2010).

6. Example of the application of ecosystem thinking to a conservation project in China

This is a project of the Kunming Institute of Botany (Chinese Academy of Sciences), initially in association with Plantlife International (Hamilton, 2008; Pei et al., 2010). It is based geographically at Ludian (Northwest Yunnan, China). The application of an ecosystem services framework to it (Table 3) is retrospective. Such a framework was not used explicitly in project design.

Table 3
Ecosystem services framework for a conservation project based on medicinal plants at Ludian, Northwest Yunnan, China (Pei et al., 2010). Supporting ecosystem services have not been included (see caption to Table 2 for an explanation). B — background conditions; P — project initiatives and results. Acronyms: HRS — Household Responsibility System, LCNTC — Lijiang City Nationality Technical College, MAP — Medicinal and aromatic plants, MPCA — Medicinal Plants Conservation Area, NP — National Park, TNC — Traditional Healthcare Practitioner, TNC — The Nature Conservancy (an international non-governmental conservation organisation). Note: Luminum Medicinal Plants Conservation Association started in Luminum Administrative Village and later expanded to cover all of Luminum Township. The name was changed to Luminum Medicinal Plants Conservation and Development Association, once it became clear that conservation had to be linked directly to development to gain much local public support. The social base of the association was reduced, adjusting a perceived over-representation of traditional doctors to better reflect the interests of the community as a whole.

| ECOSYSTEM SERVICES (categories and sub-categories) | LUDIAN: BASELINE CONDITIONS (B) AND PROJECT INITIATIVES AND RESULTS (P) |
|--------------------------------------------------|---------------------------------------------------------------------|
| **PROVISIONING**                                  | CONDITIONS AT LOCALITY (LUDIAN)                                      |
| Products from cultivated plants                   | B: Farmers and collectors selling MAP on an individual basis at low prices. P: (1) Internet access provided at Ludian to raise local bargaining power. (2) Idea of establishing an MAP marketing cooperative explored. |
| Products from wild plants                         | B: (1) Ban on logging imposed in Ludian forests in 1998 (intensive logging reduced forest cover from 80% pre 1960 to 40% in 1990). (2) Increased soil erosion, drying up of streams and a less favourable agricultural climate blamed locally on forest destruction. P: Two MPCAs of 300 ha each established in forest at Diannam and Dianbei to safeguard species, serve local medical needs and provide planting stock. MPCA retained when forests made Household Responsibility Forests in 2008 |
| Fresh water                                       | B: (1) High market demand for MAP from Ludian. (2) HRS applied to farmland from 1979, giving farmers rights of use to particular areas of land (subject to regulations). HRS extended to forests from 2005 (excludes Community Benefit Forests serving as water sources or providing ecological protection). |
| **REGULATING**                                    |                                                                      |
| Regulation of water flows, erosion and climate    | B: (1) Upper catchment of Yangtze (including the Three Parallel Rivers Area of Yunnan) a priority for natural area protection and tree planting since disastrous flooding downriver in 1998. Logging in natural forest prohibited throughout China (but some non-timber forest collection allowed). (2) TNC assisting with establishment of Lajunshan NP (Ludian is in buffer zone). |
| **CULTURAL**                                      |                                                                      |
| Medicinal plants in culture and healthcare        | B: Traditional medicine popular, using many species of MAP. (2) Many households grow some MAP for home treatments and some THPs have species-rich gardens. P: (1) 22 new herbal home gardens initiated, to provide herbs for local treatments, serve as education centres on Naxi culture and provide planting materials for farmers. (2) Workshops: 4 on Naxi Dongba medical knowledge, 5 on sustainable harvesting of wild MAP, 1 on the use of the internet for marketing. |
| Education, training and awareness raising         | B: (2) Widespread cultural support in China for traditional religions and philosophies (e.g. Confucianism, Taoism, Buddhism). (2) Some healthcare traditions of minorities officially recognised (e.g. Tibetan Medicine), but not others (e.g. Naxi Dongba Medicine). P: LCNTC plans to establish a Naxi Dongba herbal garden and Naxi hospital |
| Social organisation                              | B: Institution exists at prefectural level supportive of ethno-medicine (LCNTC). P: LCNTC instrumental in starting Lijian City Ethnomedicine Association |
| Outreach to Diqing Tibetan Autonomous Prefecture  | B: TNC assisting establishment of new Meili Snow Mountain NP (Yongzhi is in buffer zone). P: (1) TNC supports project expansion to Yongzhi. (2) Diqing County Tibetan Medicine Doctor Association formed |

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It has been proposed that initiatives focusing on medicinal plants can sometimes prove beneficial for plant conservation in places where communities have close dependencies on them for healthcare or income; there can be strong connections to cultural identity (Hamilton, 2004). Further, it has been suggested that the conservation benefits received can extend to other (non-medicinal) plants and animals too, and also associated ecosystem services, these benefitting from the efforts made by communities to provide habitats for medicinal plants. Ludian was selected as the locality for this initiative through a preliminary exercise to identify Important Plant Areas (IPAs) for medicinal plants in the Himalaya (Hamilton and Radford, 2007). The choice of Ludian was based mainly on exceptional local cultural and economic interest in medicinal plants, less so on the standard criteria used for recognition of IPAs.²

Ludian Administrative Village (AV), the core locality for community-based work under the Ludian project (especially the villages of Diannan and Dianbei), has a population of 5700 people distributed over 8 villages, with an economy based on agriculture, pastoralism and the collection of non-timber forest plants for sale (Fig. 1). Ninety per cent of farmers grow some medicinal plants for sale (providing 10–70% of household income). It is part of Ludian Township (population 17,000), itself part of Lijiang City Prefecture, and lies within the Three Parallel Rivers area of Northwest Yunnan – these rivers being the Yangtze (or Jinsha), Mekong and Salween.

Ninety per cent of people in Ludian AV are ethnically Naxi, one of China’s 55 officially recognised minority socio-linguistic groups. The traditional medical system of the Naxi is known as Naxi Donghba Medicine. The Yangtze flooded disastrously in its lower reaches in 1998, an event blamed partly on the destruction and degradation of forests upriver. This proved a turning point for environmental policy in China, catalysing a logging ban in natural forests throughout China, and programmes of large-scale tree-planting and establishment of new protected areas in the upper catchment of the Yangtze, including in Northwest Yunnan (Hongtu Yin and Changan, 2001; Zhao and Grumbine, 2011; Zhao and Shao, 2002).

Ludian Township, especially Ludian AV, is a locality famous for medicinal plants in Yunnan, being identified as the ‘home of medicinal plants’ by the Yunnan Provincial Scientific and Technological Department and a Di Dao locality for certain raw drugs used in Traditional Chinese Medicine (labelling as Di Dao means that plant material coming from here is seen as especially ‘authentic’, adding value to the produce and making its sale more reliable). There is a history of cultivation and trade in medicinal plants dating back over 200 years. A previous survey in Ludian Township had recorded a total of 363 locally growing species of plants in local medicinal use, nearly all wild collected (Wang, 1999), while another, undertaken in Diannan and Dianbei at the start of the project, found that 13% of informants relied exclusively on herbal medicine, 26% on western medicine and 61% on a combination of the two (Yang et al., 2014). This second survey further found that Naxi healers sourced 60% of the species that they use from the wild and 30% from their home gardens, with the remaining 10% purchased in the market. Healers tend to grow more species of medicinal plants than ordinary farmer-householders, those at Diannan and Dianbei being found to grow a total 63 species between them.

Table 3 is an ecosystem services framework for the project, with background conditions (B) and project initiatives and results (P) assigned to appropriate cells. The extent to which the project is responsible for some of the positive results shown is difficult to judge. Project members did make suggestions to members of the community and other social groups about what might be done, and the project did fund certain activities, but a main aim of the project team was to encourage other parties to take their own initiatives. There are signs that the project has had some success, for instance, the establishment of two Medicinal Plant Conservation Areas (MPCAs) at Ludian, the outreach of the project to the Tibetan Community of Yongzhi, and the establishment of ethno-medicine associations in Lijiang City and Diqing Tibetan Autonomous Prefectures.

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² The standard criteria used to identify IPAs are the presence of threatened species and/or habitats, also floristic richness (Anderson, 2002). The use of a subset of useful plants, in this case medicinal, to identify IPAs is questionable. Recognition of a plant as medicinal varies between individuals and communities. Plant species cannot be divided neatly in any absolute sense into those that are medicinal and those that are not. The use of medicinal plants to identify IPAs in the Himalaya is further debatable, in that the medicinal plants that have been Red-listed here are skewed towards widely-distributed species found in regional trade. Scientific knowledge about where they occur probably owes much to the history of scientific plant collecting.
The ecosystem services framework for Ludian (Table 3) differs in its detailed construction from that shown on Table 3. Flexibility could be a general principle to be followed in devising such frameworks for plant conservation purposes. It can also be seen on Table 3 that the Ludian project was fortunate in being able to benefit from a number of favourable pre-existing conditions. Local, provincial and national cultures and economies have strong connections to medicinal plants, environmental policies are favourable to forest conservation, and governmental structures give some recognition to ethno-linguistic minorities. A feature of the Ludian project is that interventions were made in connection with several different types of ecosystem services, involving several different types of social players at several social levels. Judgements on what to do and who to involve in the project were made by the multidisciplinary project team (see Table 3).

A next step for the Ludian project could be to investigate how plant conservation at Ludian can be strengthened by linking to ex situ efforts at prefectural level (a proposed herbal garden at Lijiang City Nationality Technical College and the Lijiang Alpine Botanic Garden) and with the Southwest China Germplasm Bank of Wild Species at the Kunming Institute of Botany (Fig. 2). The elements at Ludian relevant to such an integrated conservation system include the MPCAs, the gardens of local herbalists (knowledgeable about cultivation techniques and the medicinal properties of plants) and local nurseries (developed to bulk up materials obtained from the MPCAs for use in agriculture). An initial step could be to study how plant materials and information flow around such integrated in situ/ex situ conservation systems, such as already exist globally. The need for better integration of in situ and ex situ conservation efforts worldwide has been emphasized, including the greater engagement of end-users and more dynamic ex situ conservation systems than is currently the case (Maxted et al., 2016).

7. Conclusions

The decision of China to incorporate the concept of eco-civilisation construction into its national development strategy is timely because of the severity of environmental degradation, courageous because tensions will inevitably arise from pressures for immediate economic development, and momentous, given China’s record as a country capable of implementing radical policies. On the botanical front, China has several major assets that it can deploy to implement this decision, including a wealth of wild and cultivated plant diversity, a large store of indigenous ethno-botanical knowledge, and numerous local beliefs and practices (as well as the philosophical and religious traditions of Confucianism, Taoism and Buddhism), that are supportive of maintaining harmonious relationships between people and nature.

The expanded approach to plant conservation outlined here would benefit from further refinement through its application in different thematic contexts and in different parts of the world. The more specific application of this model to conservation initiatives using medicinal plants as entry points (as at Ludian), would also benefit from further development. It could prove useful for accelerating plant conservation in those many other places globally where medicinal plants play significant roles in the lives of communities (Hamilton and Aumeeruddy-Thomas, 2013). With reference to China in particular, there are many other healthcare traditions additional to those of the Naxi and Tibetans seen at Ludian and Yongzhi, altogether using a large number of species of medicinal plants. The number of documented plant species used in Traditional Chinese Medicine is 4758 and the number of plant species used by China’s minority communities estimated in total at ca. 7000–8000 (Yang et al., 2014). These figures are substantial when compared to the number of plant species in the Chinese flora as a whole (ca. 30,000). There would seem considerable potential...
for pursuing plant conservation further motivated by people’s interests in medicinal plants.

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