

Reducing China's timber deficit and restoring forest ecosystems and habitat: are they compatible?

Editorial

Faced with an insufficient forest resource, China's huge wood demand, driven by the country's economic and social evolution, cannot be satisfied by domestic resources and will have to rely more and more on imports. To exacerbate this timber deficit problem, China is implementing its Natural Protection Program, which phases out all commercial logging in natural forests. Even though China has been attempting to make up some of these losses by increasing plantation forestry, China has become the world's largest importer of logs and wood pulp, and the second largest importer of lumber and woodchips. This is in spite of the fact that China has the highest forestation rate and has the largest land cover in plantations in the world. All of this has created problems on multiple fronts. First, by importing large amounts of wood (which is estimated to be about 10% of the global production of industrial round wood), China has in essence exported deforestation to other countries; and some of these sources are through illegal logging. It has been estimated that about 20% of wood imports are sourced through illegal logging. China has attempted to reduce the illegal sources of wood by signing bilateral agreements with countries such as Indonesia and Myanmar, but this has done little to halt the import of illegal wood. Myanmar has banned the export of timber to protect what remains of its old-growth forests, but the ongoing civil war between the Myanmar military and several local militias has made the ban nearly impossible to enforce.

Secondly, many concerns have been raised regarding the vast areas of planted forests and loss of biodiversity. It is assumed and has been proven that as forests become more complex in structure and species composition, they become more diverse in the associated flora and fauna. Also, because the majority of these planted forests are planted to one species; it makes this forest more vulnerable to devastation by insects and disease. It also makes some forests more vulnerable to fire, particularly conifer (*Pinus* sp., *Larix* sp.) and eucalyptus, which have more flammable fuels. Also, the fact that these planted forests are all the same species and size (age), the forest fuels are more continuous, making any fire spread quickly through the forest. The greatest biodiversity concerns are with the planted eucalyptus forests in south China because it is a non-native species that was introduced from Australia. The flora and fauna that have evolved in association with the native forests of China over long periods of time have not been able to do so with this species/forest type. Also, because of its very rapid growth, eucalyptus is a high water demanding species. This creates a fear that over time these forests will cause soils to become drier and drain aquifers, thus contributing to biodiversity losses. Phasing out all commercial harvests in natural forests is certainly not a solution to China's timber deficit problem, but it does help to solve problems associated with the disappearance of habitats and ecosystems. According to the International Union for the Conservation of Nature (IUCN) red list there are over 385 threatened species in China, and one of the major causes of these species becoming at least threatened status is habitat loss, fragmentation, and degradation because of human activities (including logging). The country is continuing to implement policy measures to increase the quality and quantity of its

Volume 2 Issue 5 - 2017

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Received: July 21, 2017 | **Published:** July 25, 2017

forests, which has increased forest cover from about 12% thirty years ago to now over 22%.

Setting aside the biodiversity concerns for a moment, the timber deficit problem and the threatened species problem have one common root – not enough, or lack of, forest resources. Certainly in both cases the simple solution is to add forests on the landscape. But after this, the solutions take a different course. Planted forests used to reduce the timber deficit require forests of relatively rapid growth and structured for simple, efficient management with short rotations. This means the approach is to plant all of one fast-growing species at the same time in uniform spacing – creating a uniform monoculture. While this may sound appalling to some, this approach has worked very well in many countries where the goal is to maximize the volume of wood grown on a hectare per year – timber production. However, while this type of forest can provide habitat for wildlife that are habitat generalists (such as many bird species), it may not be suitable for many wildlife species that have very specific habitat requirements. We find that while all forests are not created equal, so it is with wildlife. Some wildlife will be able to make monoculture forests a place to live, other wildlife require more complex structures for their home. Phasing out commercial harvests in natural forests helps to maintain existing habitats; it does not solve the problem of habitat losses. Nor does it help solve the timber deficit problem. So, what are solutions that China can pursue to solve these problems that seem to be in conflict with each other? Preserving and improving existing habitat is a good start. However in many cases the problem is not just the quality of existing habitat, but also the particular habitat does not exist, or enough does not exist to support viable populations of an existing species. There is a need to create more habitats. These means that more land will need to be dedicated to habitat creation. While abandoned land will often over time become forested, this forest initiation process can take substantial amounts of time before a young forest becomes established. Planting trees can speed this process and at the same time create a forest of a desirable species composition. Planting a forest of

the desirable and appropriate species composition in a random order and spacing can mimic the establishment of a natural forest, and, once the forest is established allow nature to take over the processes. If managed properly, these "natural" forests can provide commercial wood resources and still provide the needed habitat; but the key words here are "managed properly". There are many examples around the globe where managing natural forests for commercial production and still maintain habitats are successful. Uneven-aged management certainly makes this possible, and the judicious use of even-aged management can be successful. Clear felling, which is often used in even-aged management, can create viable and necessary new habitats. While clear felling may cause the loss of one habitat, it will create a new one. Some wildlife species require young, early succession forests as all or part of their habitat requirements that clear felling can provide. In regard to planted monocultures for timber/wood/fiber production, it is not always necessary to plant to only one species.

Several studies have shown the benefits of mixed species plantings over pure monocultures. These include:

1. A potential to increase biomass production and carbon sequestration,
2. Improve soil fertility and enhance nutrient cycling,
3. Better protection from pest and disease outbreaks, thus improving risk management,
4. Enhanced biodiversity (flora and fauna, particularly avian communities),
5. Enhances and restores ecosystem functions, and
6. A potential to grow high value timber and at the same time provide a more diverse range of products.

Mixed species plantings do not necessarily degrade the production efficiency of a commercial operation. For example, in south China where eucalyptus is the dominant species of choice for monoculture plantations, one could do a mixed planting of eucalyptus with Alder-leaf birch (*Betula alnoidea*), which is a native species to south China. Alder-leaf birch is fast growing and well formed, is suitably used to grow large size timber, its wood is commonly used in high-quality furniture making and room decoration, its need for some shade makes it potentially suitable to plant in mixtures, it is a pioneer species that supports forest regeneration on marginal lands, clear-cuts, and forest gaps, it outperforms many other native tree species in growth, and sequesters carbon at comparable rates to eucalyptus. Alder leaf birch plantations have shown to have higher species diversity in the understory compared to other native forests. Alder leaf birch is known to play important roles in water conservation, long-term maintenance of land fertility and biodiversity of forest ecosystems. Alder-leaf birch produces a strong and durable wood, is used for producing a variety of solid wood products such as wood panels, furniture, flooring and other construction materials, and has historically brought good and competitive stumpage and lumber prices on the market (according to the China Forestry Statistical Yearbook). Within the last two decades, the wide use of this species for furniture and decoration has led to heavy deforestation, consequently resulting in a more fragmented and diminished distribution of this forest type, thus justifying its use even more.

Whether you consider pure monocultures or mixed-species plantations, another strategic management approach could be used, which has been referred to as variable retention harvests. Variable retention harvesting involves the retention of structures, organisms, and conditions from a pre-harvest forest stand for incorporation into the post-harvest ecosystem and, ultimately, the next forest stand; thus promoting biodiversity and sustainability. Basically you leave untouched parts of the forest you harvest to become part of the future forest, thereby leaving legacies of the previous forests. This provides a constant supply of structural features that are at high risk to being lost through intensive management practices and that are known to be important to biodiversity, such as large trees, snags, and woody debris; it provides refugia for sensitive species (life-boating) that will colonize the surrounding managed forest matrix as it develops suitable conditions; it establishes habitat patches and provide greater connectivity on the landscape; and it increases the structural diversity of these managed stands.

One important objective of variable retention harvesting is to "lifeboat" many of the forest-related plant and animal species, sustaining them within the harvest area until the new forest becomes established. We find that variable retention harvesting is being widely applied globally where management goals require integration of ecological, economic, and cultural objectives. The un-harvested forest areas have special ecological value since they include essentially undisturbed forest floors, and less harsh microclimates. Variable retention also provides for continuity in life-sustaining flows of energy into the soil from trees. This approach is currently being used in other countries, such as the United States, Sweden, Canada, Australia, Argentina and Chile. Increasing timber production to reduce China's timber deficit, and increasing and improving natural forests for wildlife and ecosystem services do not have to be in conflict with one another. It will take commitment and dedication from the Chinese government to find and implement the appropriate solutions; but they exist. We cannot create sustainable ecosystems without sustainable thinking. This is a necessity for mankind as is bread, water and air, one thing we all have in common. Well-known business magnate, John D. Rockefeller, once said that "If you want to succeed you should strike out on new paths, rather than travel the worn paths of accepted success." Ecological success, defined in this case as maximizing timber production sustainably while increasing and restoring ecosystems and habitat, will require China to move off of the current paths of success and blaze a new trail.

Acknowledgments

None.

Conflicts of interest

The authors declare there is no conflict of interests.

Funding

None.