

# Focus rural land policies on ecosystem services, not agriculture

Land policies around the world tend to focus on support for agricultural output. We argue that this leads to ineffective public expenditure, environmental harm and missed opportunities for the use of rural resources. Applying thinking centred on ecosystems services to the governance of rural land would secure greater social value.

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Rural land can provide a broad range of outputs in addition to agricultural products<sup>1,2</sup>, but with few mechanisms in place to incentivise their delivery, these outputs remain underprovided and uncoordinated. Governments do intervene, but generally with separate policies and agencies for separate outputs and services. Efforts to meet various objectives in agriculture, water quality, flood management, wildlife conservation and forestry are often poorly coordinated. We argue for a new approach to rural land policy that will maximise the long-term social value of services that are derived from ecosystems. This treats agricultural and other marketed products as provisioning services, alongside other environmental outputs for which there are no markets, such as biodiversity, water management, landscape, public access and carbon storage. The policy directs land uses and management practices towards a balance of marketed and non-marketed outputs. We propose a general framework for the development of an ecosystem services policy (ESP) that offers an overarching and integrated approach to rural land policy.

## The need for change

In most countries, rural land policies are agriculturally oriented<sup>3</sup>. This reflects historical concerns about food security and a desire to compensate for relatively low incomes in the sector. But circumstances change. Food security now depends more on free and reliable trade and resilience<sup>4</sup> than it does on domestic production levels. Farm household incomes are often not systematically lower than household incomes generally<sup>5</sup>. Even where some farmers do face low incomes, it makes little sense to subsidise a whole sector in order to support a minority<sup>6</sup>.

While agriculture is widely seen as a major supplier of public goods<sup>7</sup>, particularly in cultural landscapes<sup>8</sup>, agricultural policies

are also perceived as being responsible for environmental damage<sup>9–11</sup>. Agricultural policies distort commodity prices, inflate rural land prices and cushion inefficient producers against changes in the markets they sell to<sup>6,12</sup>. Under strong competition for public finance, rural land policies need to demonstrate their value to society by correcting market failures, promoting the delivery of public goods<sup>13</sup> and securing resilience in ecosystems. Despite this, policies have continued to subsidise agriculture<sup>14</sup> due to influential agricultural lobbying and severe path dependency in policy formulation<sup>15,16</sup>. For instance, over 70% of the European Union's Common Agricultural Policy budget is directed specifically to farmers simply on the basis of the area of land that they farm, with minimal requirements to deliver any clear social benefit<sup>17</sup>. To correct for these failings, rural land policy should be re-thought from its first principles.

## A new approach to rural land policy

The benefits arising from the natural environment are commonly framed as ecosystem services (ES)<sup>18–20</sup>. An ecosystem approach starts from a recognition that these different social costs and benefits derive from land and natural capital within particular places. An ES policy (ESP) aims to maximise the total sustainable social value of rural land from marketed and non-marketed ES (Fig. 1). This is not to imply that this is a measurable target, but it represents a clear goal.

We propose that this could be achieved through two mechanisms, for which we already have successful analogues. First, an ESP would support payment for ecosystem services (PES) markets where they are feasible and equitable. However, in practice, many of the services provided by ecosystems have significant characteristics of public goods that render such markets unfeasible. Thus, second, ES would be procured by the government on behalf

of the public. Following the principle of subsidiarity<sup>21</sup>, this would operate through multi-level governance (Fig. 2). We propose a two-tier system: the first tier would concentrate on services of national significance, and the second would reflect local priorities determined within a local decision-making framework.

Of course, an ESP does not cover all of the issues that would be dealt with by a conventional agricultural policy. Issues regarding food quality, the regulation of chemical use, livestock and plant disease, animal welfare, research, the development and extension of technology and information, the variability of farm incomes and management of natural disasters would still need to be addressed through other policy instruments.

## Markets for ecosystem services

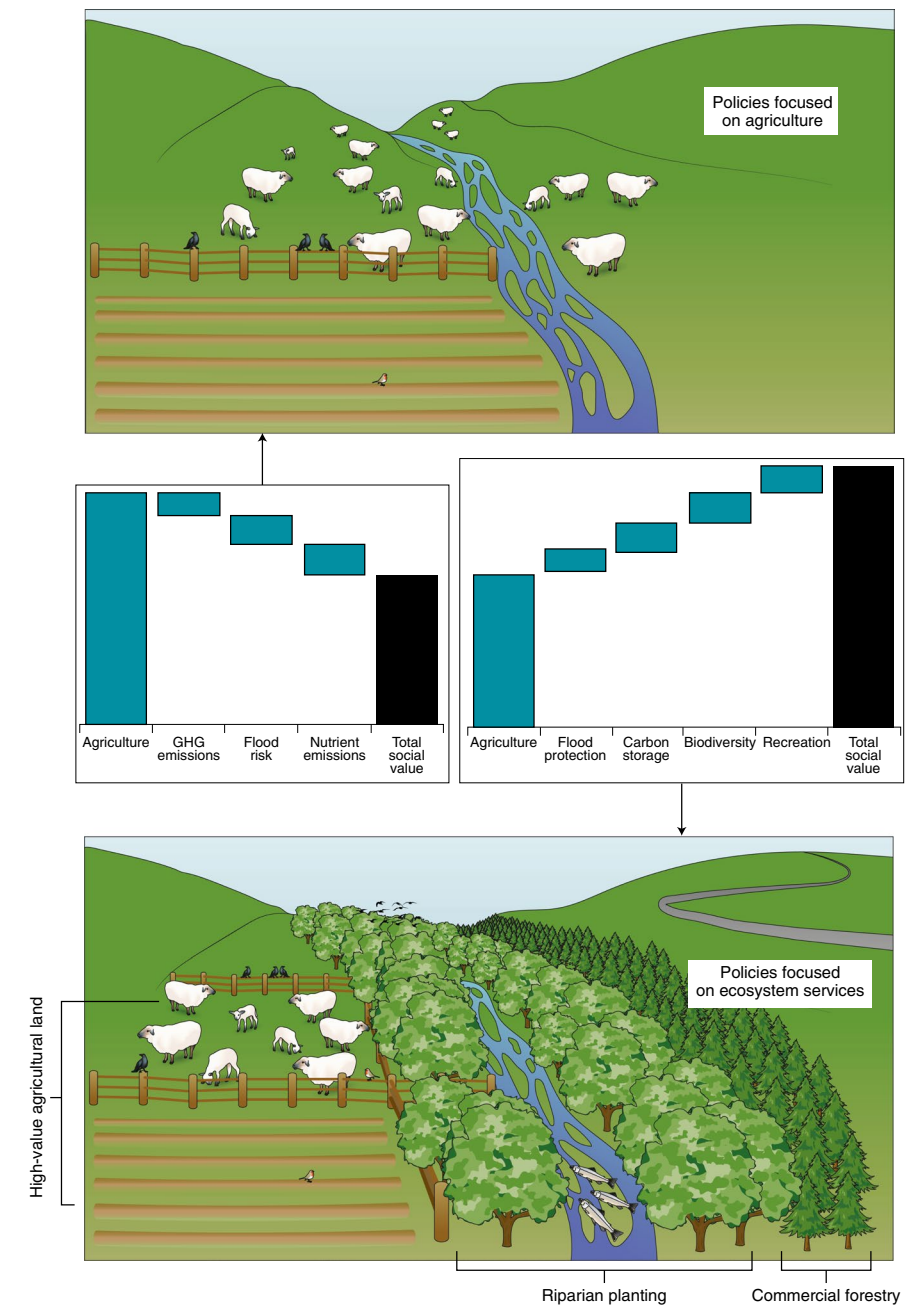
There has been intense interest in the potential of PES in order to incentivise their delivery over the past 20 years<sup>20,22</sup>. There are some successful examples of PES schemes in which beneficiaries pay producers directly for the delivery of a defined service. In the west of England, South West Water has run a reverse auction to select farmers to adopt changes in land management that would reduce emissions into watercourses from livestock production and thus reduce South West Water's water treatment costs. Despite some successful examples of beneficiaries paying producers, in practice the great majority of PES payments come from taxes and fees<sup>23</sup>. Some limitations to PES, such as regulatory limits, shifting responsibility and crowding-out, can be addressed<sup>24,25</sup>, and initiatives are underway to develop new approaches, such as better technical information and co-ordination amongst potential buyers<sup>25</sup>. But the potential for markets will be limited in the foreseeable future. The primary focus of an ESP will thus be on public procurement.

### National procurement where it's needed

A first stage in the implementation of procurement funds is a clear definition of the rights and duties in the management of the natural environment. This sets minimum standards, such as for water quality, that are enforced through regulatory processes under the 'polluter pays' principle. But the provision of other ES, such as biodiversity or public access, is typically regarded a public good, and so payment under the 'provider gets' principle is justified<sup>26</sup>.

A national government would procure ES to achieve national objectives. Such targets would include those agreed to under international agreements, such as under the Convention on Biological Diversity (CBD) or the Paris Agreement on climate change. This would help to avoid shortfalls, such as the looming failure of some countries to meet the Aichi Targets<sup>27</sup>. Procurement would also support the management of natural capital of national importance, such as in national parks. We anticipate a series of funds, each with a specific focus and remit, such as for biodiversity conservation or greenhouse gas mitigation.

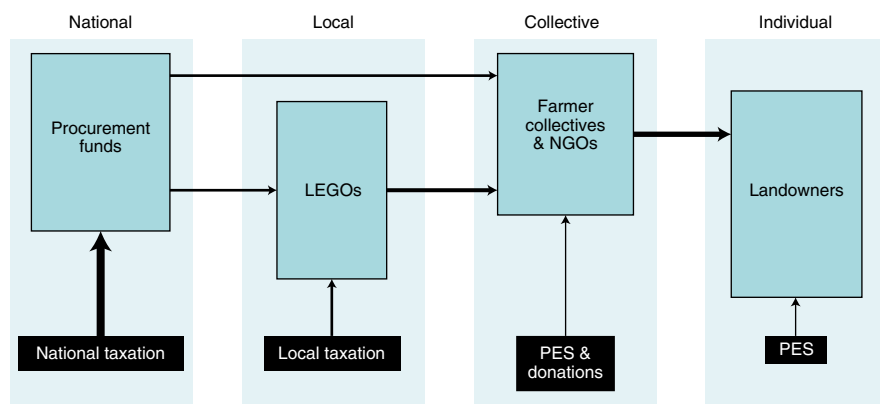
The procurement approach would build on the extensive experience from the implementation of agri-environment schemes, especially in the European Union, United States and Australia<sup>28,29</sup>, and from experience with PES schemes<sup>24</sup>. Not all interventions are successful, but many are. For instance, a 2007 systematic review of 29 studies incorporating data for 15 farmland bird species in the United Kingdom found that there were significantly higher winter densities of farmland birds on fields under agri-environment schemes than on conventionally managed fields<sup>30</sup>. This points to a number of design and implementation aspects that can be incorporated into the approach. These include various forms of coordination, such as partnerships<sup>31</sup> or farmer co-operatives<sup>32,33</sup>, competitive bidding<sup>34,35</sup> and payment by results<sup>36,37</sup>. The Conservation Reserve Program, which has been in effect in the United States since 1985, provides conservation benefits through the voluntary retirement of agricultural land. Bids are selected through a competitive discriminatory auction that ranks bids against an Environmental Benefits Index that represents both environmental characteristics as well as the amount of funding sought by the landholder<sup>34</sup>. Given the uncertainty in predicting the outcomes of interventions in ecosystems, procurement funds would operate adaptively, monitoring outcomes,



**Fig. 1 | Alternative approaches to rural land use policy.** Two illustrative scenarios for the value derived from land under policies focused on agriculture versus those focused on ecosystem services. Under policies focused on agriculture, value is generated by the production and trade of agricultural products; however, this often imposes social costs in the form of externalities, such as nutrient emissions, greenhouse gas emissions, increased flood risk and biodiversity loss. Under policies focused on ecosystem services, greater social value is realized through the strategic combination of agricultural production and ecosystem services. This reduces the value derived from agricultural production to some extent due to the re-purposing of agricultural land and adaptation of agricultural systems. However, social value increases to a much greater extent through co-benefits, including flood mitigation, carbon sequestration and biodiversity protection. A well-designed ESP shares this additional value between farmers and the wider public through judicious application of the polluter pays and the provider gets principles.

accumulating information on the methods and approaches that are more effective in delivering the relevant ES.

While this provides an important precedent in the land use sector, examples of large-scale public procurement of public



**Fig. 2 | A governance framework for an ESP.** Operation at a national level gives funding organizations the opportunity to select the most cost-effective opportunities nationally. Thus, for instance, it does not matter where carbon sequestration or greenhouse gas mitigation takes place, and so there is a benefit from identifying the most cost-effective options nationally. We anticipate that national funds will generally not enter into contracts with individual landholders. Rather, program funding arrangements<sup>57</sup> would be developed with collective organizations that can then take on contracts with individuals. This will enable national funders and collective organizations to develop close and trusting working relationships over time. LEGOs draw on funding from both national and local sources. They may either provide program funding to local collective organizations or may enter into contracts with individuals. Collective organizations could be groups of landholders working together, non-profit organizations or bespoke partnerships responding to particular contexts. Their legal status needs to be sufficiently formal to ensure long term sustainability. Non-profit organizations may raise funds from membership fees and donations in addition to public funding. Collective organizations may also be able to generate income from commercial activities operating alongside their public interest role. Where market-based opportunities generate wider social co-benefits, public procurement funding might be matched with private payments. Individual landholders may build a portfolio of contracts with national and/or local funds to deliver a range of ES. Evidence suggests that there are significant synergies and trade-offs in the provision of ES<sup>58,59</sup>. These will be most apparent to individual landholders working collectively or individually who are best informed as to the costs and potentials for integrating delivery on the ground.

goods also exist in other sectors. For example, competitively tendered public funding for research and innovation has existed for decades. Similar to procurement funding under an ESP, public funding for research and innovation seeks to realize otherwise underdeveloped values of knowledge and technology and to provide public goods that would be underprovided by markets. Furthermore, research and innovation funding is allocated at levels of organization that are similar to that required for an ESP in the land sector. While individual researchers can apply for research and innovation funding, in most cases, research groups, departments or even businesses provide efficiency gains in the realization of research objectives.

The ESP approach would go beyond a narrow focus on farmers<sup>38</sup>. While farmers and other land managers will generally be in the best position to know about the opportunities and costs of ES delivery, payments could also be made to other stakeholders, such as non-profit organizations<sup>39</sup>, potentially providing payments for research, mediation or

facilitation. There is also the potential to adopt a wider range of mechanisms, such as for land purchase or conservation covenants<sup>40</sup> to secure long-term protection for natural capital.

### Local procurement where it's needed

A second tier of public procurement would be implemented at a local level. A national government has limited information about local patterns of demand for ES, the potential for coordination of the delivery of different ES or the direct and opportunity costs of providing ES. This requires the development of local environmental governance organisations (LEGOs) (Box 1) to represent local priorities in the delivery of ES and implement local procurement schemes. LEGOs would be funded primarily by general taxation, and some system of fiscal transfers would be required to allocate funds amongst local areas<sup>41</sup>, but they could also have powers to raise their own funds locally where there is popular support for increased provision or through a tourist tax in areas that are attractive to tourists.

While we are not aware of countries that have introduced a comprehensive system of this sort, there are general principles<sup>42,43</sup> and local case studies<sup>44–46</sup> that offer a basis for its development. An example is provided by the case of Kristianstads Vattenrike, a river basin in Sweden of over 1,000 km<sup>2</sup> that has been designated as a Biosphere Reserve. The area provides a broad range of ecosystem services and is managed by a municipal organization that adopts an adaptive approach, working in collaboration with farmers, conservation organizations, local businesses and others<sup>47</sup>.

Various organizations currently work as partners in the procurement and delivery of ecosystem and other services at local scales, and these demonstrate the potential for LEGOs, such as Local Enterprise Partnerships<sup>48</sup>, Landscape Partnerships<sup>49</sup>, Catchment Partnerships<sup>50</sup> and Nature Improvement Areas<sup>51</sup> in the United Kingdom. An ESP would build on these local governance structures. Extensive experience with community-based natural resource management, such as in Australasia, points particularly to the need for the development of social and human capital<sup>52</sup> alongside developments in natural capital. This indicates that local governance organizations will take time to develop their full institutional roles through multiple modes of authority<sup>53</sup>.

One possible model is that of National Park Authorities (NPAs) in Great Britain<sup>54,55</sup>, in which the land is privately owned and managed while local populations of substantial size work and reside within park boundaries. NPA members are drawn from local communities, but NPAs receive national funding and are required to follow national procedures and guidelines. Under an ESP, the approach would be extended across all areas.

### The way forward

An ESP has potential to generate greater and more sustainable social benefits from rural land than current policies do. National governments need to set out a vision for ESP design and implementation. An ESP would be relatively complex to manage, and a governing department would, inter alia, have to adaptively balance funding amongst support for PES schemes, the various procurement funds and local-level governance. But there is extensive prior experience with the delivery of complex agricultural policies that have regulated land uses and made payments to individual farmers that demonstrates these capabilities.

The ESP would need to be implemented incrementally over a defined and planned period to avoid major disruptions that could be a source of both social and environmental losses. Rapid change could provoke bankruptcies and land abandonment,

### Box 1 | Local environmental governance organisations

In principle, a LEGO would act like a board of trustees of a non-profit organization seeking to secure the best long-term social value of ES delivered to the local community, maintaining the value of the natural capital over time<sup>60</sup>.

Trustees would be democratically appointed either by direct election or by local councils. They would thus be locally accountable but would also be subject to rules and procedures set out in national legislation that apply as a condition of the national funding.

LEGOs could focus on ES that have immediate and evident value to a local community, such as landscapes, biodiversity and public access. But they could also fill in gaps that are left after the implementation of PES markets and procurement by national funds. This might

include literally filling gaps by connecting adjacent areas of habitat that have been supported by national funds to create larger scale biodiversity conservation or recreational areas.

LEGOs would operate across areas of shared interests where ecosystem management can be enhanced through spatial co-ordination, such as catchments, in relatively homogeneous environments or areas with a common culture or outlook. At the same time, areas need to be of sufficient scale to justify professional administration. In practice, the scale and intensity of the operation is likely to vary from region to region, depending on the social value of the environmental assets present and the level of conflict over them. This would balance transactions costs against the benefits of more intensive administration.

with major costs both to the agricultural community and the local environment. Some agricultural systems that maintain valued landscapes and habitats are wholly dependent on subsidies and could not continue without them. For example, some areas are defined in the European Union as 'high nature value' farmland where biodiversity is linked with the continuation of farming on certain types of land and the maintenance of specific farming systems. Such areas would be eligible for payment in relation to the landscape and biodiversity benefits that continued farming delivers.

Where substantial levels of funding are already committed to agriculture, much can be achieved by redirecting funds. For instance, the UK government has signalled its intention to shift funds in this way after Brexit<sup>13</sup>. The periodic reforms of the Common Agricultural Policy in the European Union might also provide opportunities for shifting the focus from agriculture to ecosystem services<sup>56</sup>.

National governments will need to build political support. The point was made earlier that agricultural policies have had strong support from agricultural lobbies. There is then a need to demonstrate the potential benefits that can be attained from an ESP and to reassure others that the changes will be acceptable. There will, of course, still be gainers and losers; some farmers would lose from the removal of subsidies under current agricultural policies, but an ESP would also provide new opportunities for diversification and entry into the sector. There thus needs to be a debate about the arrangements for change.

The building blocks for ESPs already exist. The challenge is to combine these components into a coherent, overarching policy. This would incur significant transaction costs, especially in the initial stages of the policy, but we envisage that the benefits of an ESP would substantially outweigh their costs over time.

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#### Competing interests

The authors declare no competing interests.