# Solutions to Tutorial Questions

**Chapter 16 Biodiversity**

**16.1 what do ecologists think are the main drivers of global biodiversity loss?**

*The two main causes are thought to be the loss of important habitats (eg the felling of tropical rainforest) and the degradation of remaining habitats (eg loss of coral cover in coral reefs). Habitats could be lost due to conversion to other land uses which are less supportive of high levels of biodiversity (for example, converting tropical forest into soy bean production). Other important drivers are thought to be climate change and invasive species.*

**16.2 explain the “species-area curve”, and why it matters for biodiversity conservation.**

*The species-area curve shows a relationship between the remaining area of a given habitat, and the number of species found in that habitat. Higher areas imply more species. This is important for conservation in two ways. First, its tells us that having more of a habitat is preferable to having less of it. More interestingly, the shape of the typical species-area curve suggests that as the area of habitat rises, the number of species increases but at a decreasing rate. This implies that conservation should focus on protecting less-abundant habitats rather than more-abundant habitats, since more species are protected for each hectare safeguarded of a less abundant habitat.*

**16.3 what kinds of economic benefits does biodiversity conservation generate? What tools can we use to estimate these different benefit types?**

*Biodiversity generates a mix of direct and indirect benefits to people. Direct benefits are where people’s well-being is directly impacted by some change in a biodiversity indicator. For example, if golden eagle populations in Scotland rise, and people care about golden eagles. Indirect benefits occur when biodiversity is important to the ”production” of a good or service that people derive utility from, or which is valuable in production. If more diverse wild pollinators support a higher level of resilience to climate change in terms of agricultural outputs, or if more diversity in tree species reduces the expected costs of invasive pests and diseases, then biodiversity generates indirect benefits. Direct and indirect benefits could include both market and non-market values, so that all of the valuation methods set out in chapter 4 are potentially relevant to estimating biodiversity values.*

**16.4 given the high costs of protecting *all* species, economists might be asked to advise on what kinds of criteria we could use to prioritise which species to target for protection. What might these criteria be?**

*We could distinguish between criteria relating directly to preferences, and those relating more indirectly to well-being. In the former case, people may care most about familiar species, and/or about those under those under most threat. Whether the species is seen as native or non-native may also matter. In the latter case, we are interested in the role that a species plays in ecosystem functioning, and the uniqueness or distinctiveness of the species (or put another way, the genetic distance between it and another species). Finally, economists would be interested in the relative costs of protecting different species, given that conservation budgets are limited. Ultimately, the decision over how to rank species in terms of conservation priority is complex and difficult to resolve.*

**16.5 Provide an economic argument for why listing an endangered species under CITES, and thus restricting international trade in products derived from this species, might end up being detrimental to its conservation. What counter-arguments could an economist offer against the proposition that trade can benefit the conservation of an endangered species?**

*The standard economic argument here is that preventing trade in something which consumers want to buy drives up its price. This means there is a big incentive for illegal hunting of that animal or plant. Preventing legal hunting of, say, African elephants, also deprives local communities of one source of revenue to offset the local costs of maintaining such populations (such as crop damages) – although wildlife-based tourism is clearly an alternative way for local communities to gain benefits. However, partly legalising trade could easily reduce the costs of illegal hunting and so lead to an increase in illegal hunting. Fully legalised trade could drive a population to extinction, depending on the demand of “users” of the “products” such hunting generates, the costs of hunting, and the biological growth functions of the species.*