

# The identification of 100 ecological questions of high policy relevance in the UK

## 英国100个咨政相关的生态学问题

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### 简介:

这篇文章的目的是提炼出决策者关心的生态学问题, 换句话说就是找寻生态学问题和社会经济发展的结合点, 即所谓 the questions which policy makers want to answer。文章围绕生物多样性展开, 从生态服务功能等 15 个方面进行论述选取, 涉及植物、动物、微生物, 大气、土壤、海洋等各个层次。面很广, 但是并不空洞, 每一个问题都留下了无限细化的可能, 都是一个很实际的研究方向, 启发的意味很强。

### ECOSYSTEM SERVICES

1. What are the benefits of protected habitats in terms of water resources, carbon sequestration and other goods and services, relative to non-protected land?
2. What is the role of biodiversity in maintaining specific ecosystem functions (e.g. biogeochemical cycles)?
3. What are the roles of soil biodiversity (and specifically little-known groups such as mites or nematodes) in ecosystem function, resilience and recovery?
4. How does soil biodiversity both influence and respond to above-ground biodiversity?
5. What is the role of marine biota and benthopelagic coupling in ocean-atmosphere carbon cycling and primary production?
6. How can we measure natural capital (renewable and non-renewable resources) and integrate such a measure into gross domestic product (GDP)?

### FARMING

7. How will CAP reform affect biodiversity at the landscape scale?
8. What are the environmental consequences of farming patterns ranging between the extremes of widespread extensification vs. complete segregation of agricultural production and conservation areas?
9. How do farming systems such as conventional, integrated farm management and organic compare in terms of their effects on biodiversity and other environmental impacts?
10. How do current agricultural practices affect the conservation value and extent of non-agricultural habitats such as woodland edges, hedgerows and ponds, and how can detrimental impacts be mitigated?
11. What are the impacts of agricultural activities

### 生态系统服务功能

- 1、被保护的土地在水源涵养、碳获取和其他商品服务方面如何优于未保护土地?
- 2、生物多样性如何维持特定生态系统功能(如生物化学循环)?
- 3、土壤生物多样性(尤其是知之甚少的类群, 如螨类、线虫类)在生态系统功能、生态适应性和生态恢复方面如何发挥作用?
- 4、土壤生物多样性是如何影响并响应于地上生物多样性的?
- 5、海洋生物群与底栖浮游生物怎样联合作用于海洋-大气碳循环和初级生产力?
- 6、如何估算自然资源(包括可更新和不可更新资源)并将其整合到 GDP 的计算中?

### 农业

- 7、在景观尺度上, CAP 改革将对生物多样性产生什么影响?
- 8、大范围粗放型农业格局和农业生产和保护区严格分离的农业格局, 将分别对环境产生怎样的效果?
- 9、从对生物多样性的影响和其他环境效应角度考虑, 如何进行传统、大型的农业系统和有机农业管理的比较?
- 10、当前农业实践如何影响林地边缘、树篱、池塘等非农业用地的保护价值及范围? 有害影响如何减轻?
- 11、农业活动和实践(如施肥、播撒杀虫剂和物理干扰)对土壤多样性和土壤功能有哪些影响?
- 12、丘陵放牧制度的改变将对生物多样性和土壤生态系统产生什么生态学后果?
- 13、不同放养密度对土壤、被踩踏(牲畜对洪水淹没过的土壤的踩踏)的表层无脊椎动物和土壤压实将产生什么影响?

and practices (e.g. fertilizers, pesticides and physical disturbance) on soil biodiversity and soil functions?

12. What are the ecological consequences of changes in upland grazing regimes for biodiversity and soil ecology?

13. What are the impacts on soil and surface-active invertebrates of poaching (trampling of flooded soil by livestock) and soil compaction at different stocking levels?

14. What are the impacts on biodiversity of prophylactic treatment of farm livestock with antibiotics, anti-fungal and anti-helminthic compounds?

15. What lessons can be learnt from agri-environment schemes to optimize their biodiversity gain and ecological benefit?

16. How does the ecological impact of UK farming compare internationally?

#### **FORESTRY**

17. What are the environmental benefits of large-scale woodland planting schemes such as community forests and the new national forests?

18. Where should new woodlands be located?

19. What overall number, age structure and spatial distribution of trees are necessary for the long-term survival of species dependent on ancient/veteran trees?

20. What are the relative benefits for biodiversity of the re-introduction of management to ancient semi-natural woodlands vs. the continuation of an absence of active management?

21. Why have many woodland birds declined?

22. Which approach to the removal of plantations on ancient woodland sites (e.g. clear-felling and sequential removal) yields the greatest biodiversity benefit?

#### **FISHERIES, AQUACULTURE AND MARINE CONSERVATION**

23. What is the biodiversity impact of the harvest of forage fish for the production of aquaculture foodstuffs?

24. What are the ecological impacts of faecal matter, pesticides and undigested food flows from aquaculture?

25. How important are caged fishes as reservoirs of parasites and pathogens that have detrimental effects on wild populations?

26. What are the direct (catch) and indirect (food supplementation by discards, prey

14. 用抗生素、抗真菌化合物和抗杀虫剂化合物对农用牲进行预防性治疗,将对生物多样性产生什么样的影响?

15. 从农业环境计划中可以吸取什么教训从而使生物多样性和生态系统收益最大化?

16. 在国际范围内如何评价英国农业的生态学效应?

#### **林业**

17. 大范围的森林种植计划如社区林地和新的国家林地将带来怎样的环境收益?

18. 新的林地应当选址何处?

19. 对于依靠老龄树长期生存的物种,森林应当具有什么样的数量、年龄结构和空间分布格局?

20. 相对于持续无作为管理,对半自然古代森林再次引入管理,对于生物多样性有什么益处?

21. 为什么大量林地鸟衰退?

22. 对古代森林的采取何种采伐方式(例如,一次性采伐还是连续多次采伐)获得最大生物多样性收益?

#### **渔业、水产业和海洋保护**

23. 水产业对草鱼的捕捞会带来怎样的生态效应?

24. 水产业的排泄物、杀虫剂和未消化食料的水流将产生怎样的生态学效应?

25. 笼养鱼携带对野生种群具有致命作用的寄生虫和病原体,它们起着多么重要的作用?

26. 商业捕捞对于鲸类和海鸟产生那些直接(捕捞)和间接(以废弃物作为供应补偿,猎物损耗)影响?

27. 海洋保护区的面积和位置应当怎样设定才能既保护生物多样性又能促进保护区周围的渔业生产?

28. 海洋保护区对于洄游范围较广的物种,如大西洋真鳕(*Gadus morhua* L.)和黑斑鳕鱼(*Melanogrammus aeglefinus*),有什么影响?

29. 海岸、河口和河流等栖息地对于濒临灭绝的洄游鱼类种群(如七鳃鳗、西鲱、鳗鲡和鲟鱼)有怎样重要的意义?

30. 自由排放配子的海洋生物,其最小可育种群为多大?

31. 海床受到诸如挖掘、风场、油气开采等干扰,需多久才能恢复?

depletion) impacts of commercial fishing on cetaceans and seabirds?

27. How large should marine protected areas be, and where should they be located to protect biodiversity and enhance surrounding fisheries?

28. What will be the impact of marine protected areas on wide ranging migratory species such as cod *Gadus morhua* L. and haddock

*Melanogrammus aeglefinus* L.

29. How important are coastal, estuarine and fluvial habitats for endangered migratory fish populations (e.g. lampreys, shad, eel and sturgeon)?

30. What is the range of minimum viable population sizes for broadcast spawning marine species?

31. How long does the seabed take to recover from disturbance such as dredging, wind-farm construction and oil and gas extraction?

### **REACTION AND FIELD SPORTS**

32. What are the impacts of recreational activities on biodiversity?

33. Which ecological principles should guide the choice of the list of UK species appropriate for game exploitation?

34. What overall impacts do introductions of game species for field sports (including recreational fishing) have on biodiversity?

35. What are the ecological impacts (both direct and indirect, through shifts in habitat management) of a ban on hunting with dogs?

### **URBAN DEVELOPMENT**

36. How can provision for wildlife be maximized in existing and new urban development, urban greenspace and brownfield sites?

37. What are the consequences for biodiversity of fragmentation by development and infrastructure?

38. What are the ecological impacts on semi-natural habitats and ecosystems of adjacent large developments (e.g. housing and airports)?

39. How can sustainable urban drainage systems be optimally designed to maximize biodiversity in the urban environment?

### **ALIENS AND INVASIVE SPECIES**

40. What criteria should be used to determine when to intervene to deal with invasive species?

41. How can we manage microbial ecology to control invasive plant pathogens?

### **娱乐和户外活动**

32、娱乐活动对生物多样性有什么影响?

33、哪种生态学原理可以用来规范英国狩猎动物名录?

34、为户外运动引入狩猎动物(包括娱乐性的钓鱼)对于生物多样性的全部影响是怎样的?

35、禁止带狗打猎将产生什么生态学效应(直接的和间接的,由于栖息地管理发生变化而产生)?

### **城市化**

36、如何在现在和未来的城市建设、城市绿地和废弃地恢复利用中给予野生动物最大程度的考虑?

37、由于城市化和基础设施而造成的栖息地片断化对生物多样性造成什么后果?

38、大的城市区域(如住宅区、飞机场)会对毗连的半自然栖息地和生态系统产生什么生态效应?

39、如何使城市排水系统的设计最优化,从而使城市环境下的生物多样性最大化?

### **外来物种和入侵物种**

40、用什么标准来确定干预入侵物种的合适时机?

41、如何通过微生态系统控制入侵物种的病原体?

42、怎样从流行病学的角度更好地认识现存或潜在的野生动物流行病,从而有力地保护人类和家畜的健康?

43、基因改良个体产生的基因渗入现象如何威胁到英国的生物多样性?采取怎样的措施才能减轻这种威胁?

44、怎样管理欧洲蕨栖息地才能有益于相关生物多样性行动计划中涉及到的优先物种?

45、在城市和乡村生活的家猫将对脊椎动物种群产生什么作用?

### **污染**

46、塑料垃圾对海洋环境产生了什么影响?

47、如何改善空气中富集的氮对栖息地和物种的影响?

48、向具有高保护价值的水体排放氮和磷的临界量是多少?

49、正在排放和将要排放到环境中的化学物质,哪些(单个地或者联合地)正在或者将要造成严重的环境问题?这些环境问题将会是

42. How can we understand better the epidemiology of existing and emergent diseases within wildlife reservoirs to better protect humans and livestock?

43. What are the genetic threats to UK biodiversity posed by introgression from genetically modified organisms and what measures are available to reduce these threats?

44. What is the optimal method of managing bracken-dominated habitats for the benefit of associated biodiversity action plan priority species?

45. What are the effects of domestic cats on vertebrate populations in rural and urban environments?

### **POLLUTION**

46. What impact does plastic-derived litter have on the marine environment?

47. How can one ameliorate the effects of aerially deposited nitrogen on habitats and species?

48. What are the critical thresholds for nitrogen and phosphorus inputs into waterbodies of high conservation value?

49. Of those chemicals currently or potentially released into the environment, which (individually or in combination) are now, or are likely to become, significant environmental problems, and what will these problems be?

50. What are the long-term impacts of depositing sewage sludge and other organic wastes on to agroecosystems?

51. How can catchment management be used to reduce diffuse pollution?

52. How will acidification of surface water from rising CO<sub>2</sub> concentrations affect planktonic productivity and other marine organisms?

53. What are the effects of light pollution from built development and road lights on wildlife behaviour, mortality and demography?

### **CLIMATE CHANGE**

54. Which species are likely to be the best indicators of the effects of climate change on natural communities?

55. Which habitats and species might we lose completely in the UK because of climate change?

56. What will be the ecological impacts of changing agricultural patterns in response to climate change?

57. What time lags can be expected between

what?

50、下水道沉淀的淤泥和其他有机废物将对农业生态系统造成什么长期的影响?

51、集水区管理怎样应用于减少污染扩散?

52、由于 CO<sub>2</sub> 浓度增加而酸化的表面水将怎样作用于浮游生物生产力以及其他海洋生物?

53、来自建筑工地和路灯的光污染将对野生动物的行为、死亡率和种群统计产生什么影响?

### **气候变化**

54、哪个物种是气候变化对自然群落产生影响的最佳指示种?

55、何种栖息地和物种将由于气候变迁而在英国完全灭绝?

56、响应与气候变化的农业格局变迁将产生什么生态学效应?

57、气候变化和生态学变化之间在时间上存在怎样的延迟?

58、气候变化的范围和物种灭绝的格局之间最有可能的关系是怎样的?

59、气候变化和其他生态压力(如生物入侵、栖息地破碎化)的相互作用会引发怎样的协同效应?

60、怎样增强栖息地和物种的适应性以应对气候变化?

61、英国保护生物多样性的保护区系统在多大程度上能够适应气候变化?在此基础上如何改进?

62、气候变化引起的海洋条件的变化将对海洋生态系统产生什么影响?

63、应当采取什么措施使海岸景观、栖息地和物种分布区得到休养,以补偿由于海平面上升等原因造成的损失?

### **能源发电和碳管理**

64、生物燃料生产对生物多样性在林分、景观和区域水平上产生什么样的?

65、陆地或者海洋风场对生物多样性有什么潜在影响?

66、海浪等新的可更新能源将对生物多样性产生什么相应的影响?

67、怎样保留土壤中的碳?如何在土壤中保留更多的碳?

### **保护策略**

68、怎样设计生物多样性行动计划才能涵盖更

climate change and ecological change?

58. What is the likely relationship between the extent of climate change and the pattern of species extinction?

59. How does climate change interact with other ecological pressures (e.g. invasive species and habitat fragmentation) to create synergistic effects?

60. How can we increase the resilience of habitats and species to cope with climate change?

61. How well suited is the current UK protected area system for conserving biodiversity in the face of climate change, and how can it be enhanced in light of this?

62. How will changes to oceanographic conditions as a result of climate change affect marine ecosystems?

63. What actions are required to recreate the full range of coastal landscapes, habitats and species distributions to compensate for their loss, for example as a result of sea-level rise?

#### **ENERGY GENERATION AND CARBON MANAGEMENT**

64. What are the consequences of biofuel production for biodiversity at field, landscape and regional levels?

65. What are the potential impacts of (a) terrestrial and (b) marine wind farms on biodiversity?

66. What are the comparative biodiversity impacts of newly emerging types of renewable energy, such as wave energy?

67. How can soil carbon be retained and further carbon sequestered in the soil?

#### **CONSERVATION STRATEGIES**

68. How can biodiversity action plans be designed to take account of larger scale population processes?

69. How can we best measure favourable conservation status for each of the species and habitats listed within the EU's Habitat Directive?

70. How effective is the current UK protected area network for protecting wildlife under current conditions?

71. With what precision can we predict the ecological impact of different policy options and the ecological effects of management action?

72. At an international scale, what are the ecological implications of conservation actions

大范围的种群过程?

69、如何最准确地确定欧盟栖息地指令所列举的物种和栖息地的最适保护状态?

70、在现有条件下英国野生动物保护区网络发挥了多大作用?

71、可以在何种精度水平上预测不同政策和不同管理方式的生态学效应?

72、英国采取的保护措施和政策将产生什么国际性的生态学意义?

73、针对全部生物多样性个人确定的指示物种(如鸟类)的指示效果如何?

74、普通蛾类为什么衰退?这种衰退会引发其他类群(如蝙蝠)的衰退吗?

75、土地利用的范围和类型应当怎样进行变革才能实现,至2010年生物多样性不再衰退的目标(2001年欧盟戈德堡峰会,各国首脑达成一致)?

76、用生活史和其他生态学理论对知之甚少的物种进行长期可维持性的预测,是不是一种可行的方法?

#### **栖息地管理和恢复**

77、在乡间较广阔的地域进行大面积保护,相较而言将保护工作的重心集中在特定地区的成本收益如何?

78、将“原始化”(即完全或者在很大程度上按照自然发展的过程对保护地进行保护)作为一项长期保护策略将会带来什么生态学后果?

79、各种不同的沼地管理方式(如火烧、砍伐和放牧)将对丘陵生态系统、碳贮存、水质以及生物多样性造成什么后果?

80、应当采取什么标准量度栖息地条件以评估保护区内栖息地的变化情况?

81、应当怎样管理干涸或者通水的水渠以达到生物多样性的最大收益?

82、怎样设置树篱结构以及何种管理方式最有益于野生动物?

83、重建栖息地如何不同于类似的半自然栖息地?

84、怎样使可实施的大尺度生态恢复工程被优先考虑?

85、在陆地和淡水栖息地的恢复程中,如何在生态可承受限度内有效地处理过剩有机营养?

86、鹿密度下降对不同景观类型的农业、林业和生物多样有什么意义?

and policies adopted within the UK?

73. How effective as indicators of overall biodiversity are current indicators (especially birds)?

74. Why are common moths declining and are their declines driving declines in other taxa (e.g. bats)?

75. What scale and type of land-use change is required to halt the decline of biodiversity by 2010 (EU heads of state committed to this in the 2001 EU summit in Göteborg)?

76. Are there reliable ways to predict the long-term sustainability of populations of poorly known species (e.g. most invertebrates) using a knowledge of life history and other ecological characteristics?

## **HABITAT MANAGEMENT AND RESTORATION**

77. What are the costs and benefits of concentrating conservation work on designated sites in comparison with spreading efforts across the wider countryside?

78. What are the ecological consequences of 'wilding' (that is, conservation of sites using only, or very largely, natural processes) as a long-term conservation strategy?

79. What are the consequences of different moorland management techniques (especially burning, cutting and grazing) for the upland economy, carbon storage, water quality and biodiversity?

80. What measures of habitat condition should we use to measure habitat change in protected areas?

81. How should ditches, dry and wet, be managed for the greatest benefit for biodiversity?

82. What hedgerow structure and what type of hedge management produce the greatest wildlife benefits?

83. How do recreated habitats differ from their semi-natural analogues?

84. How can we effectively prioritize the most important large-scale ecological restoration projects that could be undertaken in the UK?

85. What is the most appropriate and ecologically sustainable way of dealing with excess nutrients during terrestrial and freshwater habitat restoration?

86. What are the implications of changing deer densities for agriculture, forestry and biodiversity in different landscape types?

87. 对于物种再引入，种源地重要吗？非本地种源将引起本地基因变异的消失、远交衰退和基因库萎缩的遗传拯救吗？

## **连通性和景观结构**

88. 栖息地片断化与物种类别、功能群的消失存在多久时间延迟？

89. 扩大现有栖息地斑块面积或者在现有景观中建立更多斑块，哪种方式更有利？

90. 在不同空间尺度上，应当怎样设计景观镶嵌体以保护多个物种？

91. 不同栖息地连通性指标分别有哪些相对优势？哪种指标对保护价值的预测性最好？

92. 树篱、铁路、道路边缘、河岸带等线形栖息地，作为破碎化栖息地斑块之间的廊道，有什么价值？

93. 适用于物种的概念是什么？源种群和衰退种群 (Pulliam 1998) 怎样界定？如何根据它们的不同状态进行保护？

94. 对单个物种的保护策略，核心区和边缘区分别起到如何重要的作用？

95. 小的动植物自然种群在多大程度上依赖于非保护区中存留的栖息地？

## **水域保护**

96. 过去和现在的围栏捕鱼、铺设水底管道、移除砂粒层、片断化栖息地、筑坝等等河岸带工程将给河岸和河流内部的生物多样性带来什么后果？

97. 英国的大尺度河漫滩保护计划将产生什么样的生态学效应？会比传统的硬性防洪措施更经济有效吗？

98. 水质和河底沉淀物的变化对生物多样性造成的最有可能的后果是怎样的？

99. 如何准确估计欧盟水框架指令的生态学效应？

100. 合适的栖息地管理和保护如何有助于防洪？对生物多样性有什么影响？



87. In reintroductions, does local provenance matter? Will the use of non-local stock cause loss of local genetic variation, outbreeding depression or genetic rescue of depauperate gene pools?

### **CONNECTIVITY AND LANDSCAPE STRUCTURE**

88. What are the lag times between habitat fragmentation and the loss of species of different taxonomic and functional groups?

89. Is it better to extend existing habitat patches or create further patches within the landscape?

90. How should we manage landscape mosaics for the conservation of diverse taxa that operate on different spatial scales?

91. What are the relative merits of different indices of habitat connectivity? Which of them best predict conservation value?

92. What is the value of linear habitats, such as hedgerows, railways, road verges and riparian strips, as corridors for dispersal between fragmented habitat patches?

93. For species where the concept is applicable, how can 'source' and 'sink' populations (Pulliam 1988) be identified and how should their status affect conservation management?

94. How important are core vs. peripheral areas in the conservation strategy of a species?

95. How reliant are animal and plant populations in small nature reserves on the maintenance of habitat in surrounding non-protected areas?

### **MAKING SPACE FOR WATER**

96. What have been the consequences of past and present riparian engineering works, such as weirs, culverts, gravel removal, habitat fragmentation and damming, on biodiversity within and alongside rivers?

97. What would be the ecological implications of large-scale river and floodplain restoration schemes in the UK, and would they be more cost-effective than traditional hard flood defences?

98. What are the likely consequences for biodiversity of changes in water quality and sedimentation in rivers?

99. What methods most accurately measure 'ecological status' in the EU Water Framework Directive?

100. How can flood control be assisted by appropriate habitat management and restoration, and what are the impacts on biodiversity?