

Evolving 5-19 Biology

Sustainability Education



Royal Society of
Biology

Sustainability education

Sustainability education has strong links to the Royal Society of Biology's *Evolving 5-19 Biology: recommendations and framework for 5-19 biology curricula (2021)*¹, especially its big question "How do organisms live together?" Sustainable solutions are considered within the "Applications of Biology" dimension. The exploration of the framework that follows was developed alongside the UN Sustainable Development Goals² and can be used to provide a real world urgency to the teaching of ecology. This document is aimed at school leaders with responsibility for implementing a sustainability curriculum.

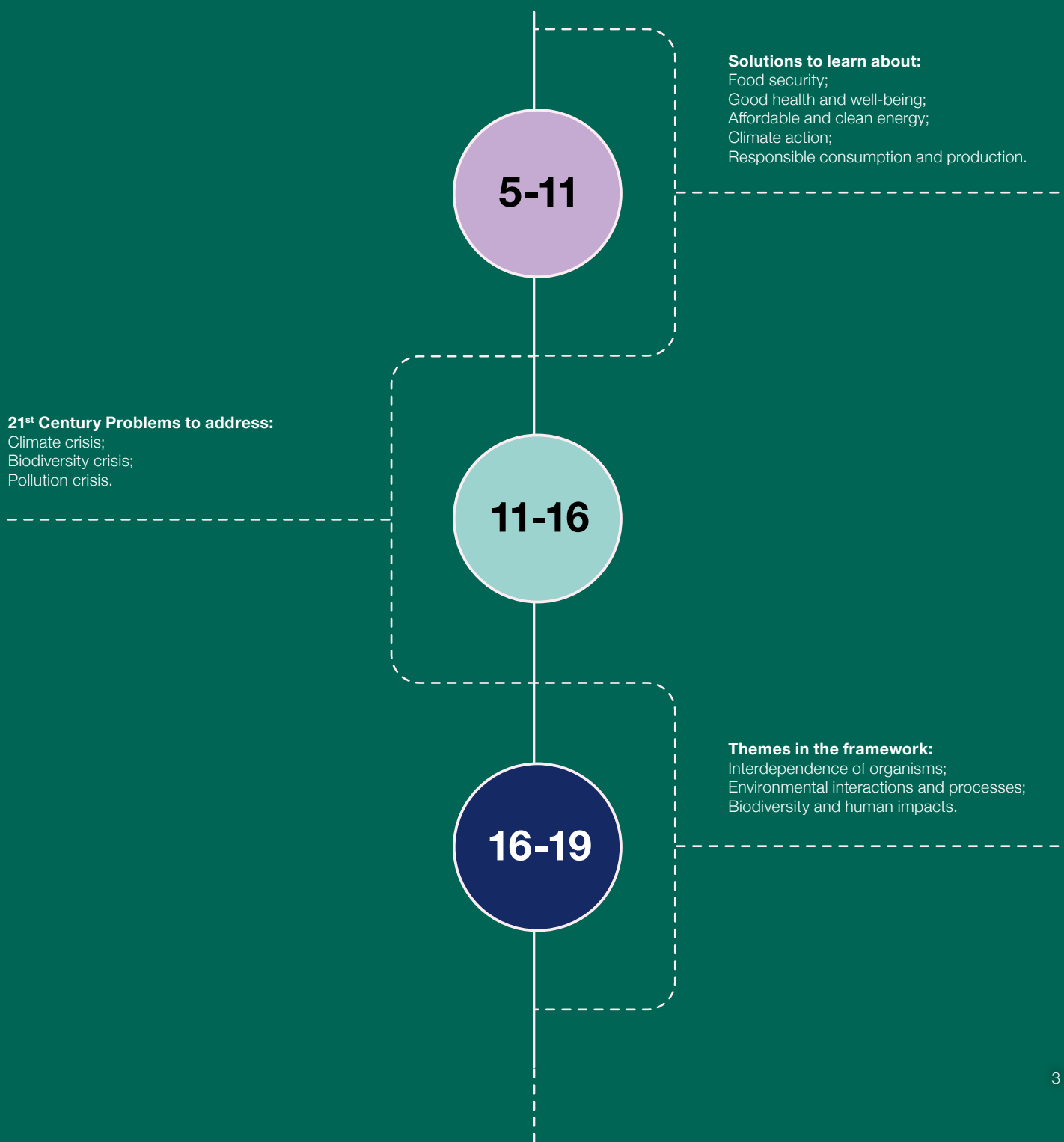
This is a response to contemporary calls for a curriculum strategy to address issues about sustainability and climate change:

- Fourth UN Sustainable Development Goal for quality education.²
- Department for Education policy paper 'Sustainability and climate change: a strategy for the education and children's services systems', which recommends that all "[schools develop] a whole [-school] approach to sustainability and climate change", through the establishment of a lead practitioner, presumably at senior leadership level, within schools or academy trusts.³
- The Vision 2030+ Report of the Learning for Sustainability National Implementation Group in Scotland.⁴
- Wales and the sustainable development goals from the Welsh Government.⁵

An integrated strategy for sustainability education would be cross-curricular, involving other subjects, such as chemistry, physics, geography, personal, social and health education, history and economics, alongside biology and would include practical elements of experiences and visits. It would aim to develop positive values of citizenship, by emphasising local and national responses to issues as well as an appreciation of global initiatives.

One important feature of the *Evolving 5-19 Biology: recommendations and framework for 5-19 biology curricula* is that it considers progression across three learning stages from ages 5-19. This is important for sustainability education - careful emphasis should be placed on the sequencing of ideas within and between learning stages, so that concepts are introduced only when pupils have the necessary preliminary knowledge and language to understand them.

Sustainability and Environmental Education in Evolving 5-19 Biology



The statements below outline an approach to a sustainability curriculum progressing across the learning stages. The statements are taken from the *Evolving 5-19 Biology*, with suggestions for activities that could help support learning to align with the statements.



Ages 5-11



Explore ways in which human actions affect local habitats, and the organisms that live there, in positive and negative ways

Students could: Look at the consequences of unsustainable living on different ecosystems, e.g. polar bears in the warming Arctic.

They could also look at ways in which humans farm and hunt animals for food and study aquatic food chains to become familiar with fishing and fish farming.



Recognise that human actions affect a range of habitats, and the organisms that live there, in positive and negative ways

Students could: Study the ways in which humans farm and hunt animals for food, or undertake a case study of a local habitat that is being managed sustainably. They could discuss how fishing can allow fish stocks to remain sustainable.

Teachers could: Use outdoor spaces to demonstrate links between habitat diversity and biodiversity. They could also demonstrate different habitats and their food chains, and the consequences of the removal of stages of the chain.



Ages 11-16



Benefits of biodiversity to humans.

Students could: Explore the impact of bioaccumulation of pesticides, which can kill predators in food webs. Biological control methods may provide a sustainable solution but have risks as well as benefits.



The impact of biodiversity loss on human food and water security.

Students could: Carry out case studies which link areas of the world that have food or water insecurity, with possible solutions to the issues. This should be linked with ideas such as deforestation, habitat fragmentation, overfishing and invasive species.



Abiotic and biotic factors affect biodiversity within an ecosystem.

Teachers could: Model the impacts of altering one abiotic or biotic factor within an ecosystem to demonstrate the potential wider impacts of small, seemingly inconsequential changes.



The positive and negative effects on biodiversity of human interactions within ecosystems.

Students could: Link the impacts of climate change with disruption to the water cycle in some habitats, leading to a reduction in available water for drinking and for agricultural food production. Technological and ecological solutions, for example, improved water management and the conservation of wetland and aquatic habitats may improve the local water supply.



The impacts of climate change on the distribution of organisms.

Students could: Consider technological and ecological solutions, for example, carbon capture and re-forestation programmes that may reduce the accumulation of carbon dioxide.



Ages 16-19



Carry out a field investigation into the impact of one or more abiotic factors on the distribution and abundance of key organisms in a habitat.

Students could: Study the impact of some of the UK's invasive species, such as the grey squirrel, Japanese knotweed, Himalayan balsam or American bullfrogs.



Effective management of the conflict between the needs of the growing human population and conservation to help maintain sustainability of resources and biodiversity.

Students could: Explore the links between a balanced ecosystem and public health and wellbeing, such as the availability of fresh water, food, fuel and the spread of disease.



The biological factors affecting levels of food security including increasing human population, changing diets, new pests and pathogens, environmental change, sustainability and cost of agricultural inputs.

Students could: Link the impacts of climate change and habitats, which are causing some species to become extinct. The migration of species into existing ecosystems may cause increased instability and loss of biodiversity. It would also be an opportunity to look at the spread of infectious diseases with changes in deforestation, land-use change and water management.



About the **Royal Society of Biology**

The Royal Society of Biology (RSB) is a single unified voice for biology: advising government and influencing policy; advancing education and professional development; supporting its members, and engaging and encouraging public interest in the life sciences. The RSB represents a diverse membership of individuals, learned societies and other organisations. Individual members include practising scientists, pupils at all levels, professionals in academia, industry and education, and non-professionals with an interest in biology.

The RSB seeks to support biology education at all levels, and actively engages with education policy through formal consultation responses, convening special interest groups and collaborating and coordinating with other science organisations.

As part of our next steps following publication of *Evolving 5-19 Biology: recommendations and framework for 5-19 biology curricula*, this document forms part of a suite of summaries and further consideration into aspects of the framework, with a view to signposting resources to, and disseminating best practice for teachers who are developing school, curriculum and qualifications policy, evidence-based teaching orders and interdisciplinary areas of study.

www.rsb.org.uk/curriculum

Please cite as Evolving 5-19 Biology: Sustainability Education, Royal Society of Biology (December 2023)

References

1. Evolving 5-19 Biology: recommendations and framework for 5-19 biology curricula (November 2021)
2. The UN Sustainable Development Goals, United Nations (September 2015)
3. Sustainability and climate change: a strategy for the education and children's services system, Department for Education (April 2022)
4. Vision 2030+ Concluding report of the Learning for Sustainability National Implementation Group, Learning for Sustainability National Implementation Group (March 2016)
5. Wales and the Sustainable Development Goals – Supplementary Report to the UK Voluntary National Review, Welsh Government (July 2019)

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