

Plastic pollution in the oceans

Challenge Overview Sheet

Plastics are a group of materials created through human ingenuity. Manufactured from petrochemicals, some of the earliest plastics include cellophane, bakelite and PVC which were all developed in the early 1900s; polystyrene and styrofoam date from the 1950s. Fragments of plastics from these early years of manufacturing can still be found in our oceans today, along with trillions of tiny pieces of more recent debris. The volume of plastic waste entering the oceans has grown exponentially in recent decades, fuelled since the 1970s by the arrival of disposable plastic bags and the rise of bottled water **mass consumption** in developed and emerging economies. Bags and bottles are now the major ingredients of the ‘throwaway plastic soup’ in the world’s oceans.

Emerging from **point sources** all over the world – such as sewer outlets and rivers emerging from large urban areas – plastic pollution is a problem that has truly ‘gone global’ on account of ocean circulation. Planetary-scale currents have carried waste to the remotest corners of the world including both Arctic and Antarctic once-pristine **wilderness** areas. Materials have also been corralled at higher densities into five enormous **garbage patches** far from any shoreline in the middle of the world’s major oceans. Broken into ever-smaller particles by **attrition**, plastic pollution is a problem that sometimes becomes less visible as the particles fragment at a microscopic level – but it is a problem that does not go away. Indeed, the tendency of large fragments to shatter into smaller pieces can create even greater health hazards for marine organisms that unwittingly ingest the plastic.

Plastic pollution in oceans is a topic that embraces the full breadth of GCE and diploma A-level Specifications. An outcome of global-scale physical and human processes, the phenomenon has global impacts too – some are physical impacts, such as the adverse effects on ocean biogeography and marine **food chains** in **pollution hotspots** but also in *all* areas due to diffusion of tiny physical particles and solutes derived from plastic degradation; others are human impacts, such as the pollution of remote rural wilderness shorelines that depend on tourism for vital revenues. Finally, there is the challenge of tackling the problem to consider - action is needed at a range of scales to address the degradation of oceans and shorelines by plastic debris.

This is clearly a topic well-suited to Year 13 teaching to help students prepare for their A2 synoptic studies, or in the case of IB, for the global interactions higher level extension paper.

This scheme of work – designed to span at least two teaching periods – includes homework and classroom activities spanning the inter-linked topics of **globalisation**, **ocean circulation**, **marine biodiversity** and **sustainability** initiatives.