**Royal Holloway**

**Geography for Schools**

**Lecture Series**

Drylands in a changing world

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**A-Level Syllabus:**

* AQA Hot desert systems and landscapes: Deserts as natural systems; Desertification (past and future)
* OCR Dryland landscapes: How can dryland landscapes be viewed as systems? How do dryland landforms evolve over time as climate changes?

**Drylands account for over 40% of the Earth’s continental and surface and are home to approximately 35% of the World’s population. An understanding of how Drylands functions and the nature of the processes that operate within them is, therefore, important in establishing how large areas of the Earth’s surface have developed and what challenges the people living in these regions face. In this lecture we will consider some of the key characteristics of the world’s Drylands, namely: 1) How are Drylands classified? 2) Why do Drylands form? 3) How do Drylands change and evolve overtime? and 4) How will Drylands change in the future as a result of global warming?**

**We will begin by considering the concept of the Aridity Index (or AI) which is effectively a simple equation for characterising Dryland regions. It is essentially a measure of the balance between precipitation (the amount of water coming into a region) and evapotranspiration (the amount of water being lost from a region either through direct evaporation into the atmosphere or transpiration of water through plant metabolism. The lower the AI the drier the region is. Generally an AI of <0.65 is considered the threshold for Dryland regions with semi-arid regions, such as southeast Spain, having AI values of of ca 0.2-0.5 and hyper-arid areas, such as the Sahara, having AI values of ca <0.05. Whilst the AI determines how we classify Drylands what causes them to form is more varied and we will discuss the main reasons for the distribution of these regions, including; 1) Atmospheric circulation patterns; 2) Continentality, 3) Topography and the distribution of mountain ranges and 4) Position of cold ocean currents.**

**As well as accounting for the distribution of Drylands at the present day, the second half of this lecture will focus on how and why Drylands change over time. 20,000 years ago the deserts of the world were all more extensive than they are at the present day, whilst 8,000 years ago regions such as the Sahara desert were lush grasslands characterised by extensive lakes and river systems. These major swings in climate are driven by cyclic changes in the shape of the Earth’s orbit and the tilt of the Earth’s orbit which work together to control the amount of energy from the sun different regions of the Earth receive. Computer model predictions of the Earth’s climate under higher greenhouse gas concentrations offer insights into how Drylands may evolve in the future with most studies suggesting that major deserts will expand towards the poles. This would suggest that regions such as the Meidterranean, on the northern boundary of the Sahara, will become more desert-like.**