**Unit Assessment**

**Populations and Ecological Footprint**

• A population is a group of organisms of the same species living in the same area at the same time, and which are capable of interbreeding.

• S and J population curves describe a generalized response of populations to a particular set of conditions (abiotic and biotic factors)**.**

• Limiting factors will slow population growth as it approaches the carrying capacity of the system.

• A community is a group of populations living and interacting with each other in a common habitat.

• Methods for estimating the abundance of non-motile organisms include the use of quadrats for making actual counts, measuring population density, percentage cover and percentage frequency.

• Direct and indirect methods for estimating the abundance of motile organisms can be described and evaluated. Direct methods include actual counts and sampling. Indirect methods include the use of capture–mark–recapture with the application of the Lincoln index.



– *n*1 is the number caught in the first sample

– *n*2 is the number caught in the second sample

– *n*m is the number caught in the second sample that were marked.

• Species richness is the number of species in a community and is a useful comparative measure.

• Demographic tools for quantifying human population include crude birth rate (CBR), crude death rate (CDR), total fertility rate (TFR), doubling time (DT) and natural increase rate (NIR).

• Global human population has followed a rapid growth curve, but there is uncertainty as to how this may be changing.

• As the human population grows, increased stress is placed on all of the Earth’s systems.

• Age–gender pyramids and demographic transition models (DTM) can be useful in the prediction of human population growth. The DTM is a model that shows how a population transitions from a pre-industrial stage with high CBRs and CDRs to an economically advanced stage with low or declining CBRs and low CDRs.

• Influences on human population dynamics include cultural, historical, religious, social, political and economic factors.

• National and international development policies may also have an impact on human population dynamics.

• Carrying capacity is the maximum number of a species, or “load”, that can be sustainably supported by a given area.

• It is possible to estimate the carrying capacity of an environment for a given species; however, this is problematic in the case of human populations for a number of reasons.

• An EF is the area of land and water required to support a defined human population at a given standard of living. The measure of an EF takes into account the area required to provide all the resources needed by the population, and the assimilation of all wastes.

• EF is a model used to estimate the demands that human populations place on the environment.

• EFs may vary significantly by country and by individual and include aspects such as lifestyle choices (EVS), productivity of food production systems, land use and industry. If the EF of a human population is greater than the land area available to it, this indicates that the population is unsustainable and exceeds the carrying capacity of that area.

• Degradation of the environment, together with the consumption of finite resources, is expected to limit human population growth.

• If human populations do not live sustainably, they will exceed carrying capacity and risk collapse.