1. (a) (i) insects; *[1]*

(ii) fungi; *[1]*

(b) (i) many species simply have not been discovered yet (large areas of tropical forest/deep ocean unexplored for example);
rate of extinction is so rapid that some species become extinct before we have discovered them;
small organisms hard to find/capture/identify; *[1 max]*

(ii) vertebrates are larger, so are easier to find/catch and classify;
there are fewer species of vertebrate, so the chance of finding all of them is higher; *[1 max]*

(c) *e.g.* for insects, use a large sweep net to capture;
and then identify using keys the number of species;
count number of individuals in each species;
use Simpson's diversity index (involves total number of insect species and number of individuals);
number of species must be recorded within a given area (*e.g.* number of species in a quadrat/hectare); *[3 max]*

(d) *No mark for naming an ecosystem, but if no ecosystem is named award* *[1 max]*.

e.g. Coral Reef off coast of Philippines

direct threats: *[1 max]*
aggressive fishing techniques *e.g.* dynamite fishing / cyanide fishing;
collecting shells/coral for souvenirs for tourist industry;

indirect threats: *[1 max]*
coral reefs then become more vulnerable to storm/cyclone damage / disease / sea temperature changes (due to global warming);
siltation due to mangrove clearance and run-off from coast; *[2 max]*

2. (a) LEDC
basic/lack of technology generally;
rice farming is typical of LEDCs / where rice is often the staple crop;
cash crops for export such as sugar cane, tobacco;
houses look fairly simple and made from local / cheap materials / thatched roofs;
dependence on working animals;
labour intensive (family labour);
mixed cropping on small scale;   *[2 max]*
Award [0] for only stating LEDC.

(b) *inputs*: *[1 max]*
water / technology / cattle (livestock) / sunlight / rain / manure / seed / labour / soil;
Award [1] for any three of the above.

processes: *[1 max]*
planting / ploughing / harvesting / irrigating / repair / respiration / run-off / labour;
Award [1] for any three of the above.

outputs: *[1 max]*
jute / vegetables / mangoes / Jack fruit / Palm / coconut / sugar cane / spices / crops / waste / income / energy / rice / food / Betel nuts / tobacco / cattle (livestock) / heat / oxygen / carbon dioxide / wheat / mustard;   *[3]*
Award [1] for any three of the above.

(c) different crops planted at different levels;
rotation of crops to match seasonal rainfall patterns;
monsoonal climate so main crop is rice;
irrigation technology used in dry season;
livestock fed differently at different times of year;
different jobs done at different times of year;   *[2 max]*
Accept other reasonable answers.
Answers must be linked to variations in environment.

(d) (i) when nutrients, dissolved in water, wash down through the soil/paddy and are lost;   *[1]*

(ii) process by which nitrogen in atmosphere is fixed to form nitrate by blue-green algae (and converted into a useable form for plants);   *[1]*

(e) (i) because the terraces are level there is little run-off by water so soil is not washed away / terraces prevent soil erosion / soil collects in paddies;   *[1]*

(ii) oxygen is required by decomposers to break down organic matter (the oxidized zone is closer to the surface and richer in oxygen) / higher BOD in oxidized zone as more decomposers, thus more decomposition;   *[1]*

3. (a) energy is dissipated/lost along the food chain / converted to less useful form;
this is because species at each trophic level are using some of the energy for
respiration, and some is lost as heat/waste to the environment;   *[2]*

(b) photosynthesis/primary production is the process by which green plants convert
light energy into a usable form/chemical energy/food/organic matter;
requires carbon dioxide, water, chlorophyll and light;
involves production of oxygen;   *[2 max]*
Give credit for chemical equation.

(c) coal / oil / natural gas;   *[1]*
Award [1] for any two of the above.

(d) *Accept any reasonable environmental problem.*
problem: *[1 max]*
e.g. noise pollution / air pollution / global warming / acid rain;

explanation: *[2 max]*
e.g. urban air pollution caused by release of hydrocarbons (from unburned fuel)
and nitrogen oxide;
nitrogen oxide reacts with oxygen to form nitrogen dioxide, a brown gas that
contributes to urban haze;   *[3]*

(e) zone D;   *[1]*

(f) primary productivity is the gain in energy/biomass by producers/autotrophs
whereas secondary is gain by heterotrophic organisms;
primary productivity is the conversion of solar energy whereas secondary involves
feeding/absorption;   *[1 max]*

(g) availability of light *e.g.* deep oceans dark below surface limits productivity of plants;
availability of water *e.g.* tropical rainforests receive lots of rainfall each year
whereas deserts have little rain which is limiting to plant growth;
temperature *e.g.* rainforests warm throughout the year so have a constant growing
season and higher productivity;
nutrient availability *e.g.* estuaries receive lots of sediment from rivers;   *[2 max]*
Award [1 max] for no reference to the biomes in figure 6.

4. (a) (i) *Accept answers between*
8.0 and 8.5 <u>billion</u>; *[1]*

(ii) population momentum; *[1]*

(iii) $10.2 - 8.3 = 1.9$
$\dfrac{1.9}{10.2} \times 100 = 18.6\%$; *[1]*

(b) *e.g.* unwanted fertility – poor rural women in Nigeria

may like to be able to limit their family size, but are unable to use family planning
because of attitude of their societies (who value male fertility);
religious intolerance to family planning;
because of rural isolation and an inability to access family planning centres;
lack of education about family planning;

e.g. desire for large family size in India

patriarchal society and many offspring seen as a symbol of male fertility;
children seen as a source of income;
farm labour;
seen as security in old age (no social security system);
cultural expectation for sons;
high infant mortality rate so large families necessary to ensure survival of some;
tradition for large family;
few options for women; *[3 max]*
Award [0] for naming countries.

(c) natural resources/food will become so scarce that population is limited by hunger;
population limited by wars over scarce resources;
as nations develop economically and move through stages of demographic transition, growth rates can be expected to decline for a variety of socio-economic reasons;
government strategies/policies *e.g.* tax incentives;
greater access to family planning as communications/education/wealth increases;
changing attitudes will reduce desire for large families; *[2 max]*
Accept any other reasonable suggestions.

5. (a) perhaps cartoonist is suggesting that politicians/society refuse to act because they
             claim that more research needs to be done first;
             despite the fact that evidence (falling birds) is in front of their eyes;   *[2]*
             Accept similar interpretations of cartoon, no need to mention acid rain.

        (b) conflict might exist because different groups see the resource differently;
             economic value of timber/land is incompatible with leaving forest standing for
             other uses (indigenous cultures);
             indigenous tribes need large amounts of space in which to live sustainably;
             reserves left for indigenous people may be too small to sustain them;
             forest is cut down by outsiders ignoring the needs of indigenous people;
             intrinsic value of forest (biorights) is ignored by exploitative users only interested
             in economic use;
             difference between sustainable use of forest (natural income) and users who exploit
             natural capital;
             conflict between short-term and long-term perspective (indigenous people);   *[3 max]*