Diploma Programme
Programme du diplôme
Programa del Diploma

Environmental systems and societies
Standard level
Paper 1

Specimen paper

1 hour

RESOURCE BOOKLET

Instructions to candidates

- Do not open this booklet until instructed to do so.
- This booklet contains **all** the resources to answer paper 1

16 pages

International Baccalaureate
Baccalauréat International
Bachillerato Internacional

Figure 1a: World map showing location of Mongolia
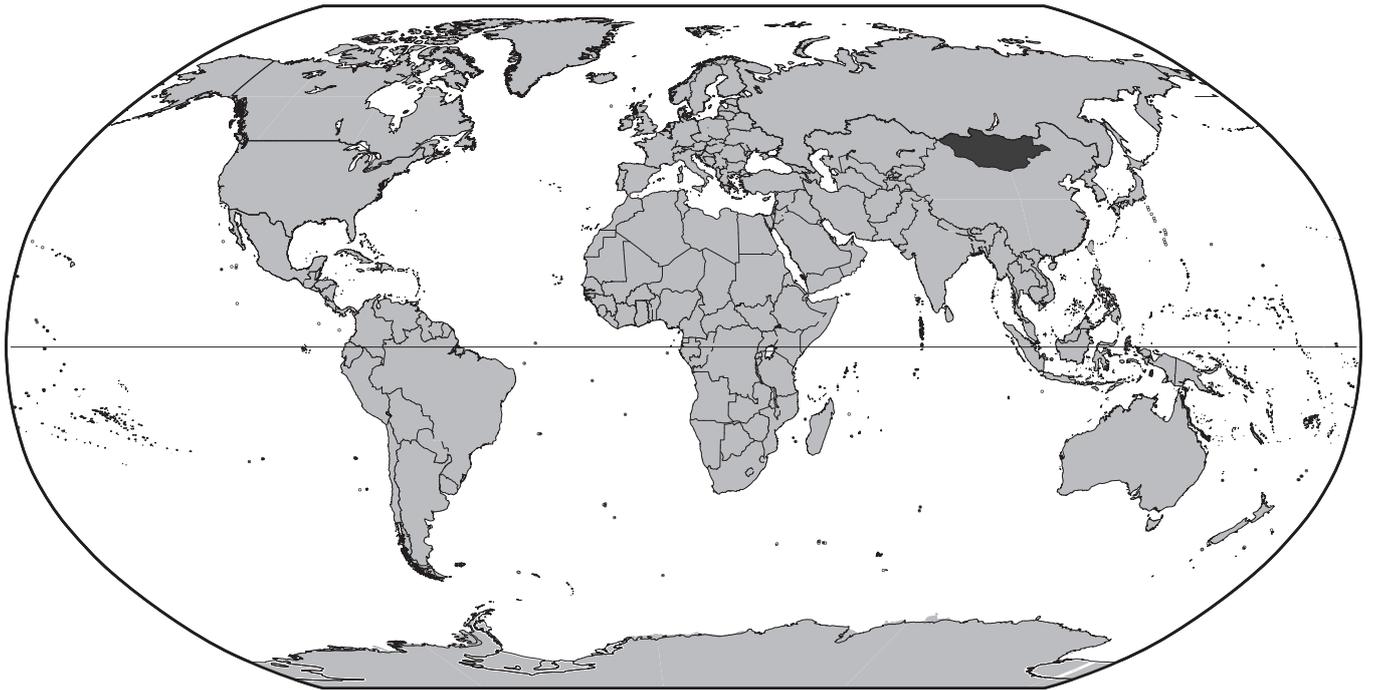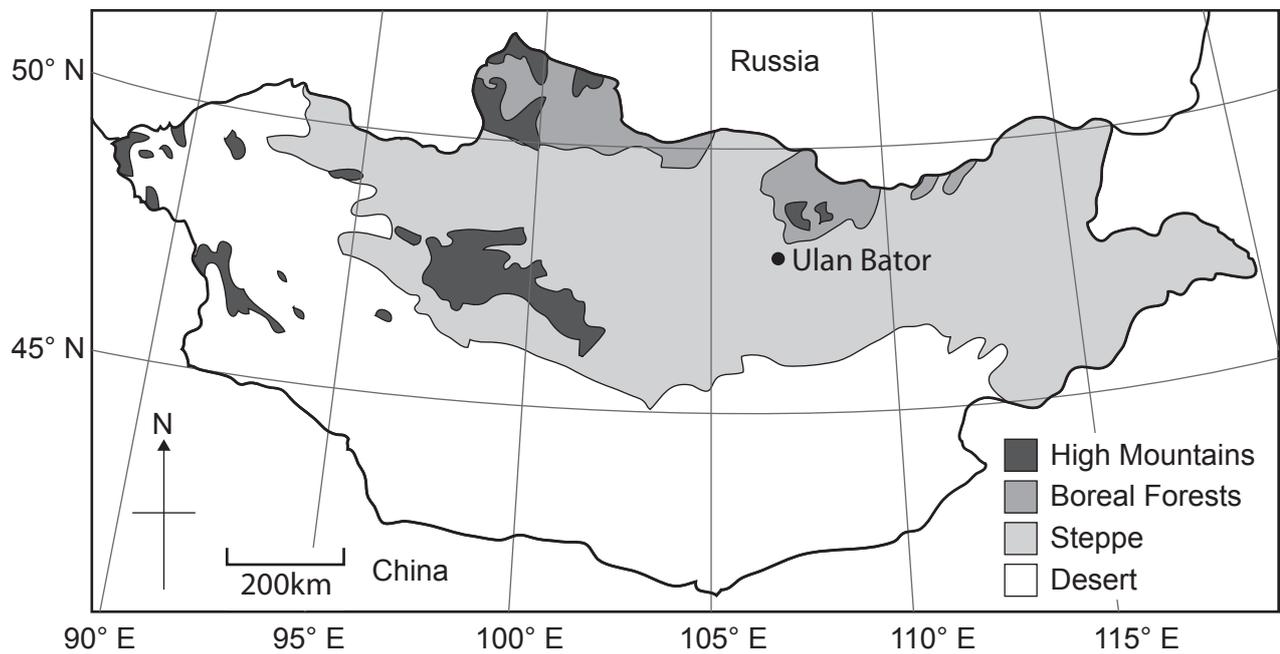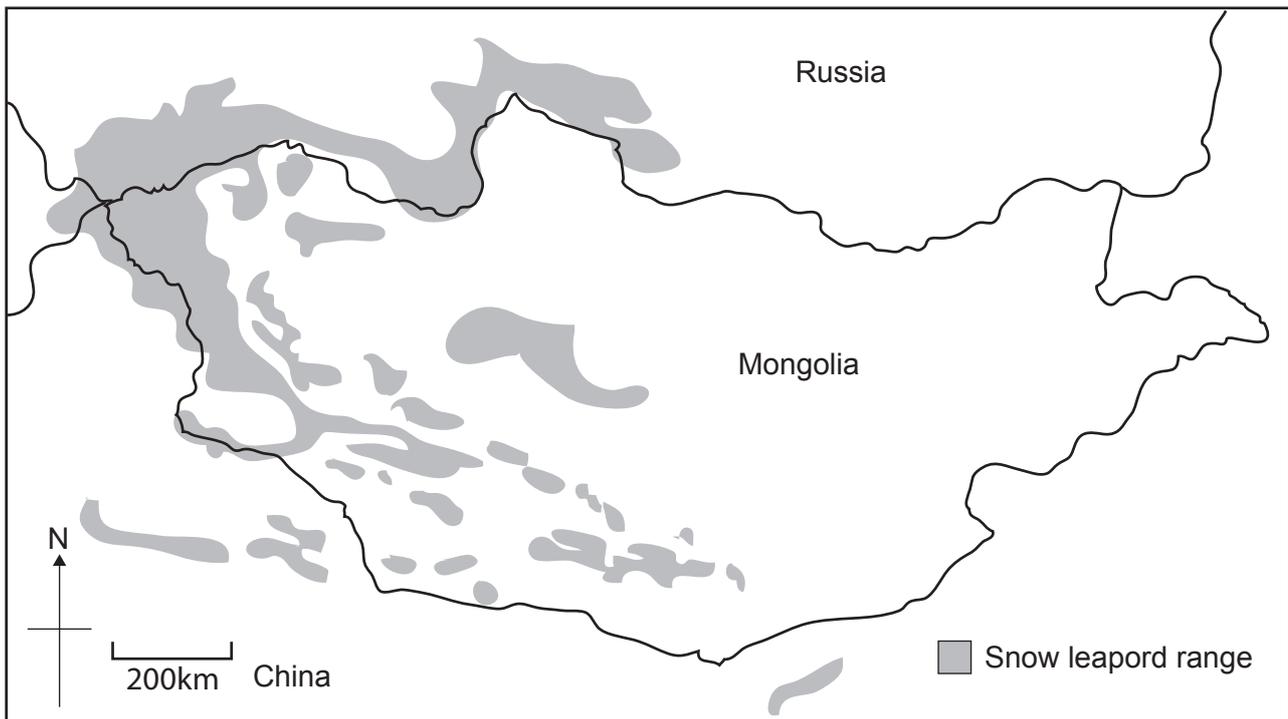

Figure 1b: Detailed map showing Mongolia

[Source: www.cia.gov]

Figure 1c: Map showing the range of the snow leopard


[Source: www.tendua.org]

Figure 2: Fact file on Mongolia

- Mongolia covers 1.5 million sq km. Only 1% of this is used for settlements and farming
- It is a land of natural contrasts made up of large areas of flat, unforested grassland (steppe), mountains in the west, and the Gobi Desert in the south
- 80 % of the country lies 1000m above sea level
- The population is 2.7 million, 40 % of whom live in the capital city, Ulan Bator
- The rest of the population is spread over large, often inaccessible areas. Many are nomadic herders living in yurts
- Mongolia is one of the poorest countries in Asia
- In the Human Development Index Mongolia is ranked 108 out of 187 countries
- 13 % of land area is protected.

[Source: extract – fact file from Mongolia, Geofile 658, Nelson Thornes 2012,
reproduced by permission of the publishers, Oxford University Press]
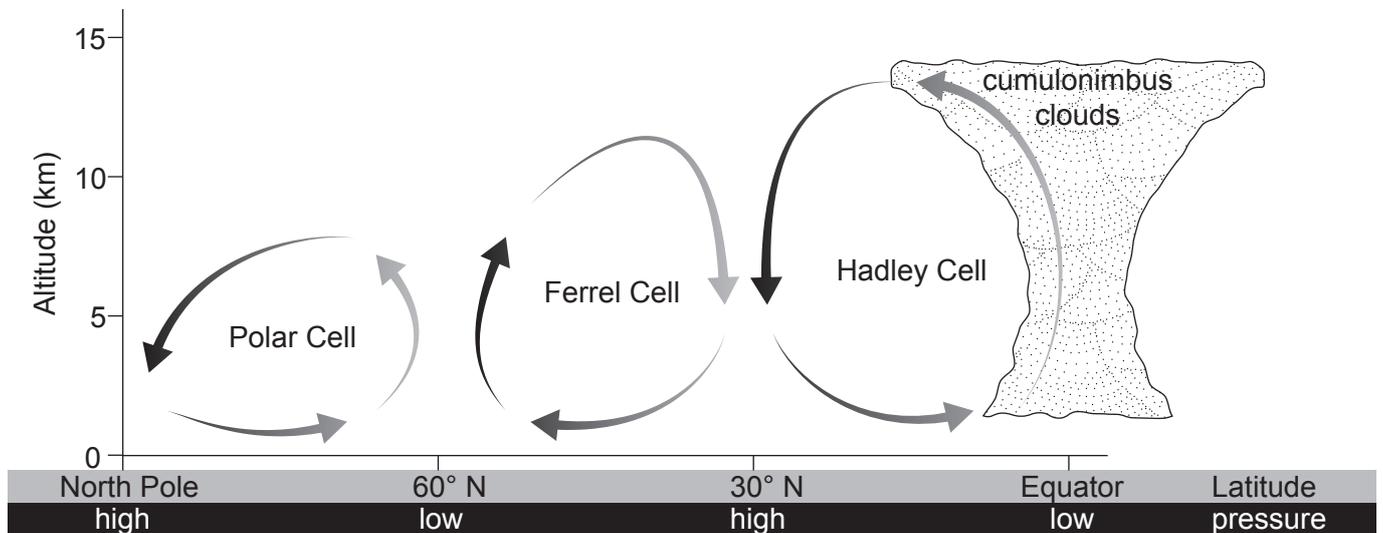
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Figure 3a: Climate graph of Ulan Bator, Mongolia

Mongolia's harsh climate has always presented its people with problems:
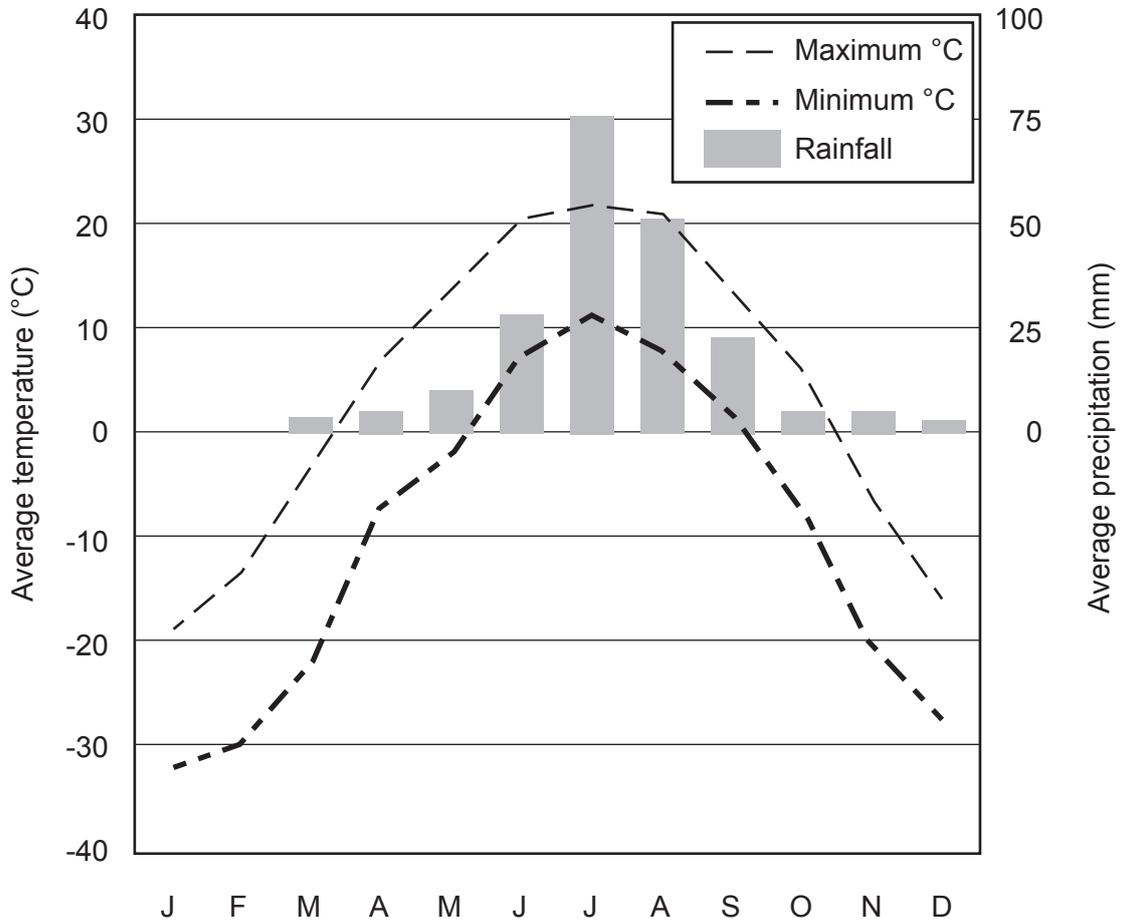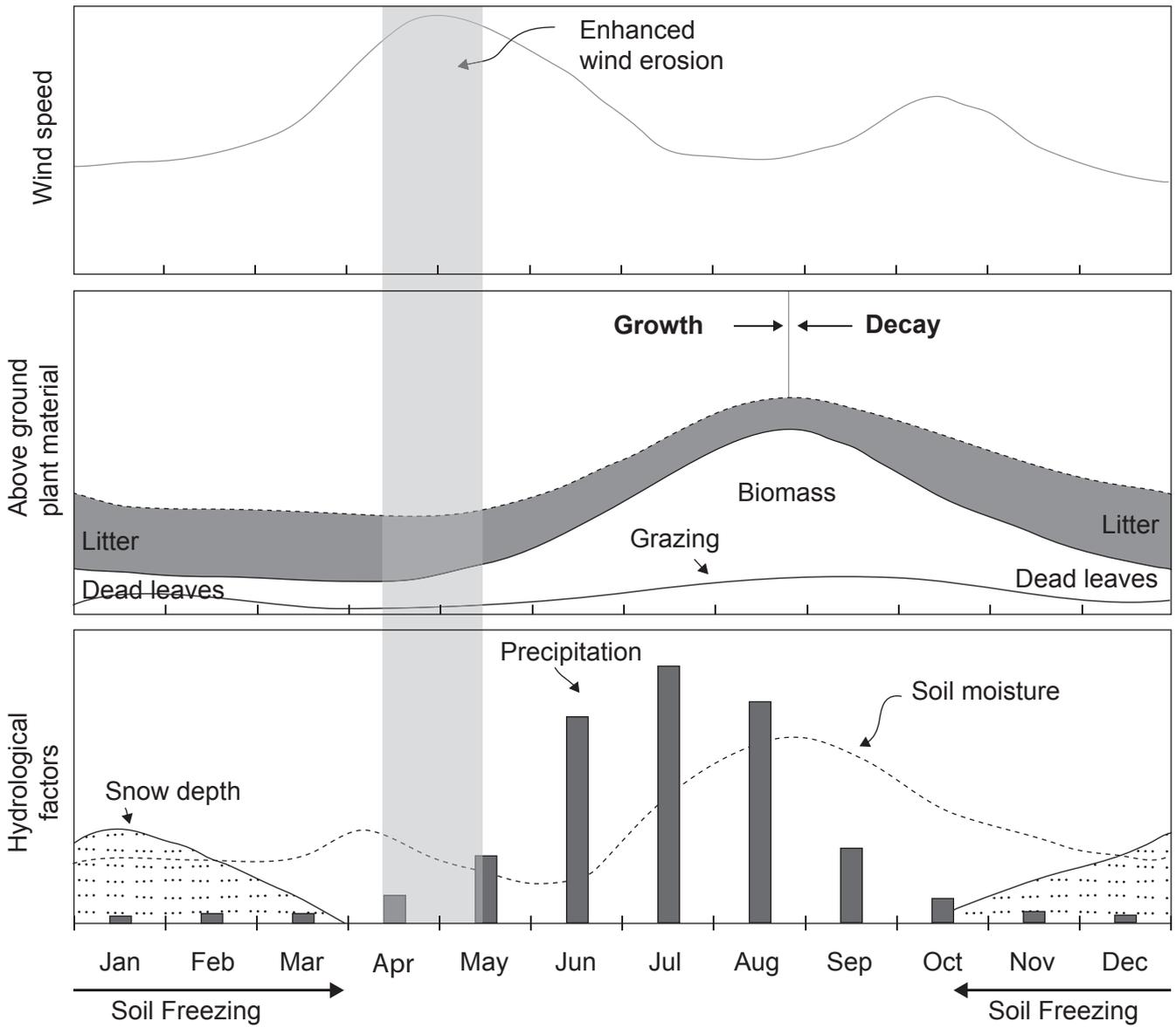

[Source: wikimedia.org]

Figure 3b: Tricellular model

[Source: www.geogonline.org.uk]

Figure 3c: Graphs to show the relationship between climate, biomass and soil erosion

[source: www.origin-ars.els-cdn.com]

Figure 4a: Fact file on Mongolian species

- 139 mammal species, 450 species of birds (including 331 migratory and 119 resident birds), 76 species of fish, 22 reptile species, and 6 species of amphibians
- More than 3,000 species of higher plants, 927 lichens, 437 mosses, 875 fungi. Many other species, however, remain to be classified
- 150 endemic plant species and a number of endemic animal species such as the Saiga antelope.

[Source: www.en.wikipedia.org]

Figure 4b: Photos showing Mongolian flora and fauna

Sheep's fescue *Festuca ovina*

[Source: http://stevensonintermountainseed.com]

Bactrian camel *Camelus bactrianus*

[Source: www.letus.org]

Przewalski's horse *Equus ferus przewalskii*

[Source: http://nature.ca]

Saiga antelope (endemic) Tatarica mongolica

[Source: http://beniceartfriends.com]

Snow leopard *Uncia uncia*

[Source: © WWF]

Feather grass *Stipa pennata*

[Source: http://en.wikipedia.org © Sten Porse]

Turn over

Figure 5a: Nomadic herders fact file

About 30 % of Mongolians live as nomadic herders on sparsely populated grasslands. The herders'
cattle, sheep and goats represent their wealth. They use them to pay for everything from food to
medicine and schooling for their children.

These grasslands develop rich fertile soils that have supported nomadic pastoralists for centuries, but
they are also highly vulnerable to degradation due to wind erosion and over grazing. Changes in climate
can cause further degradation of these soil systems.

Harsh conditions can make life very hard. In a recent survey over 97% of the herders interviewed
believed climate change to be a problem in their area.

The environmental conditions they described were:
- frequent drought followed by Dzud (severe winter) events with heavy snowfall
- drying up of rivers and springs and reduction in drinking water
- reduction of feeding value of pasture land and hay making yield
- increased sand movement and desertification
- decrease in animal body weight leading to decrease in the production of meat, milk, wool
  and cashmere.

Figure 5b: Photos showing nomadic herder life

Inside a yurt

[Source: Donna Caplinger]

A yurt

[Source: http://upload.wikimedia.org]

Frozen livestock killed by severe cold

[Source: http://news.bbc.co.uk]

Mongolian herder gathering cashmere wool from goat

[Source: www.globalenvision.org]

Snow leopard doll made from wool felt by Mongolian women

[Source: © Snow Leopard Trust]

Goat herder child

[Source: from the case study "food security in the face of climate risks – Mongolian herders' experiences" presented by Batkhishig Baival and Bayarmaa Baljinnyam at the Mary Robinson Foundation organised Hunger-Nutrition-Justice 2013 Conference in Dublin 15–16 April 2013]

Figure 6a and b: Climate data for Mongolia

Figure 6a: Annual average air temperature in Mongolia, 1940–2008
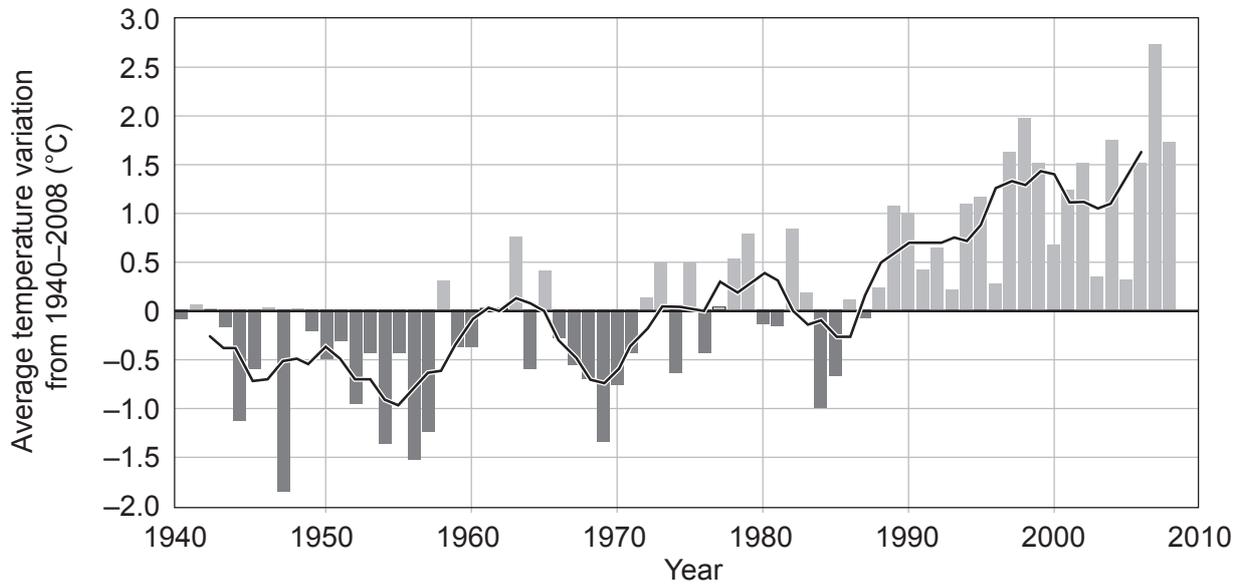
Figure 6b: Total annual precipitation in Mongolia, 1940–2008
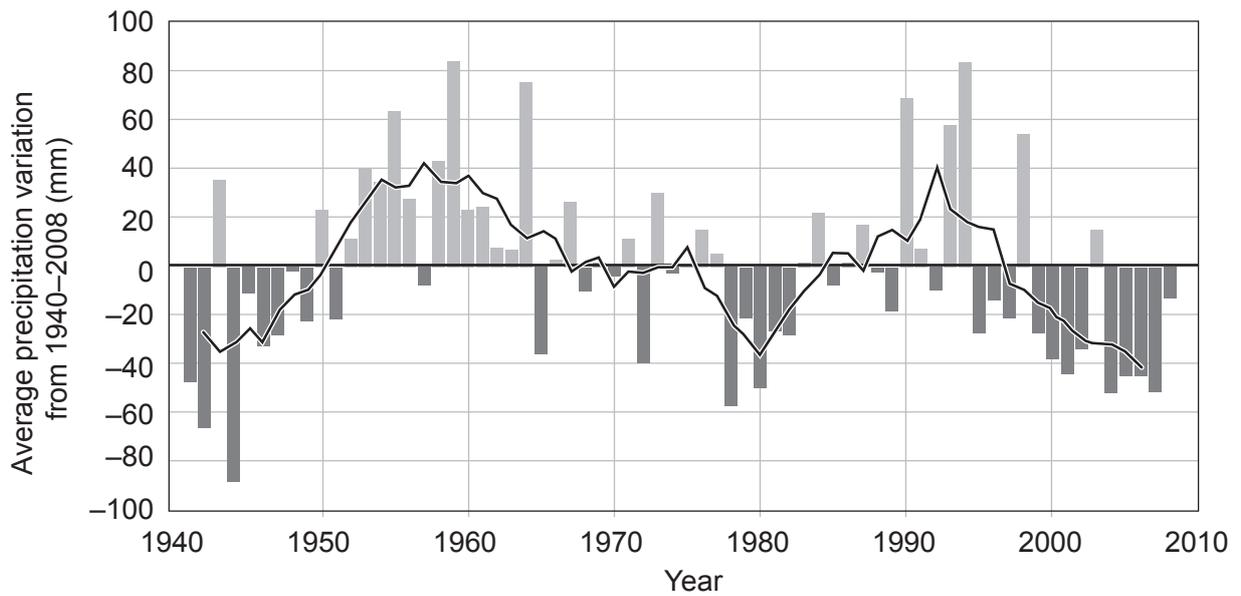

[Source: Mongolian met office]

Figure 7a: Changes in pastoralism in Mongolia

Nomadic pastoralism is when livestock (groups of animals) are moved to find fresh grazing pastures. The movement can be anywhere at any given time with no set path or pattern.

Settled pastoralism is when the animals are kept in the same place for the whole year, or at least most of it. A permanent place to keep the animals is needed, such as a barn.

There has been a recent trend for nomadic pastoralists to settle near Ulan Bator. This is because of the higher price of meat in these areas and the harsh conditions on the steppe. The Government has encouraged nomads to settle as this is seen as being more developed.

Figures 7b: A study comparing the degradation of land under nomadic pastoralism and settled pastoralism using computer modeling
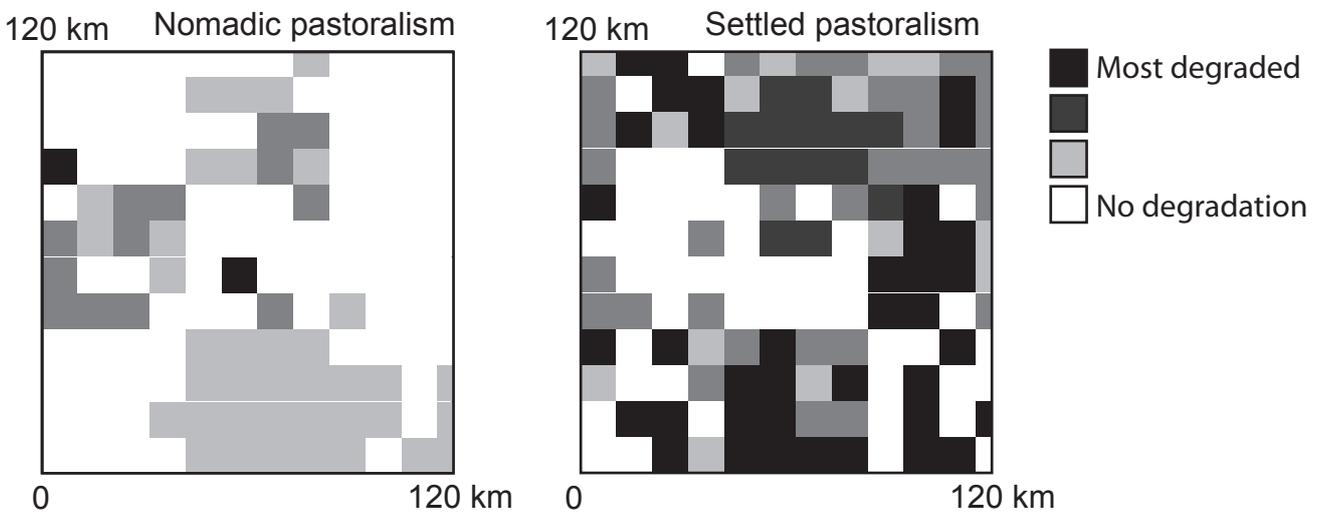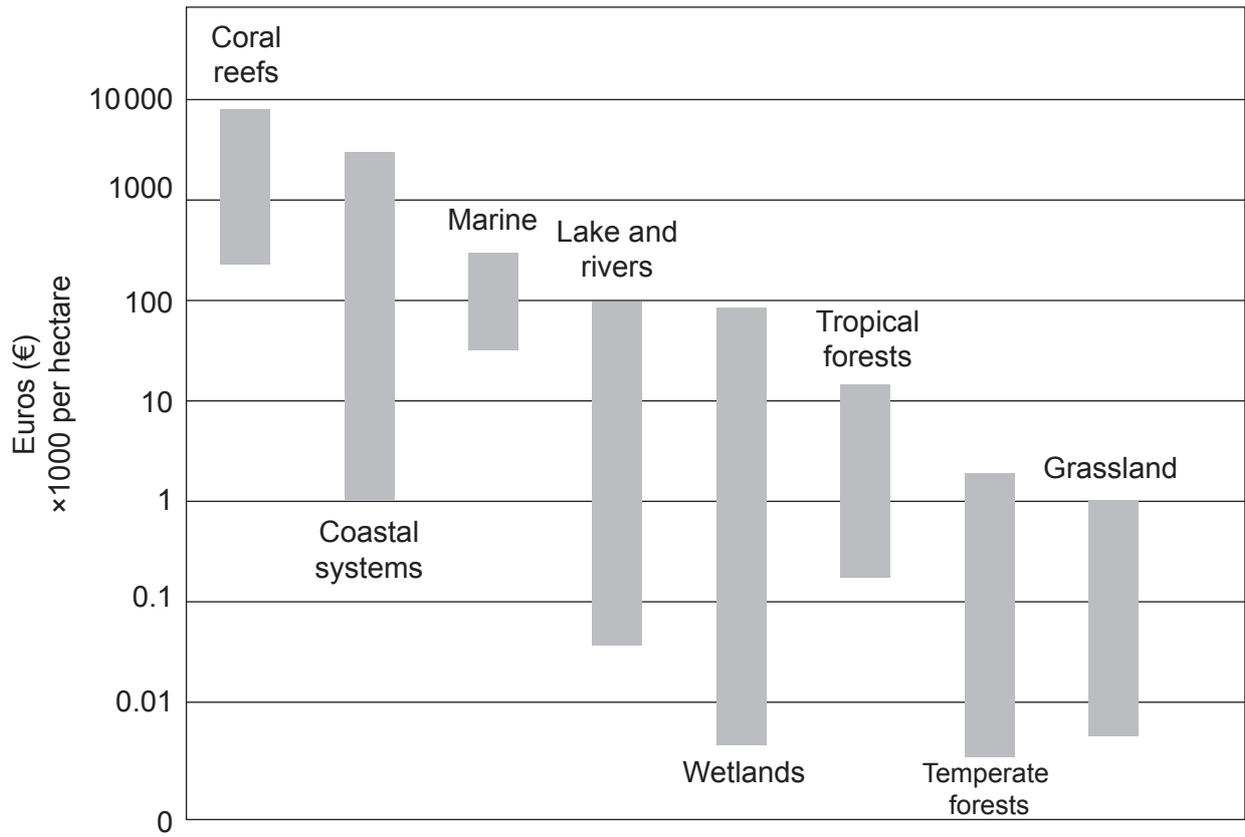

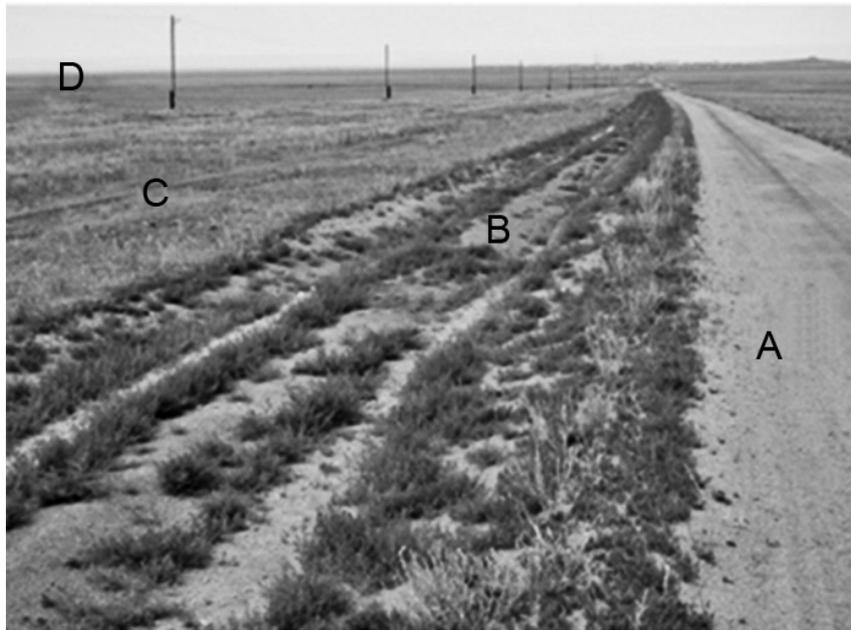**Figures 7c: Changes in the number of animals owned by households**

[source: http://www.chikyu.ac.jp]

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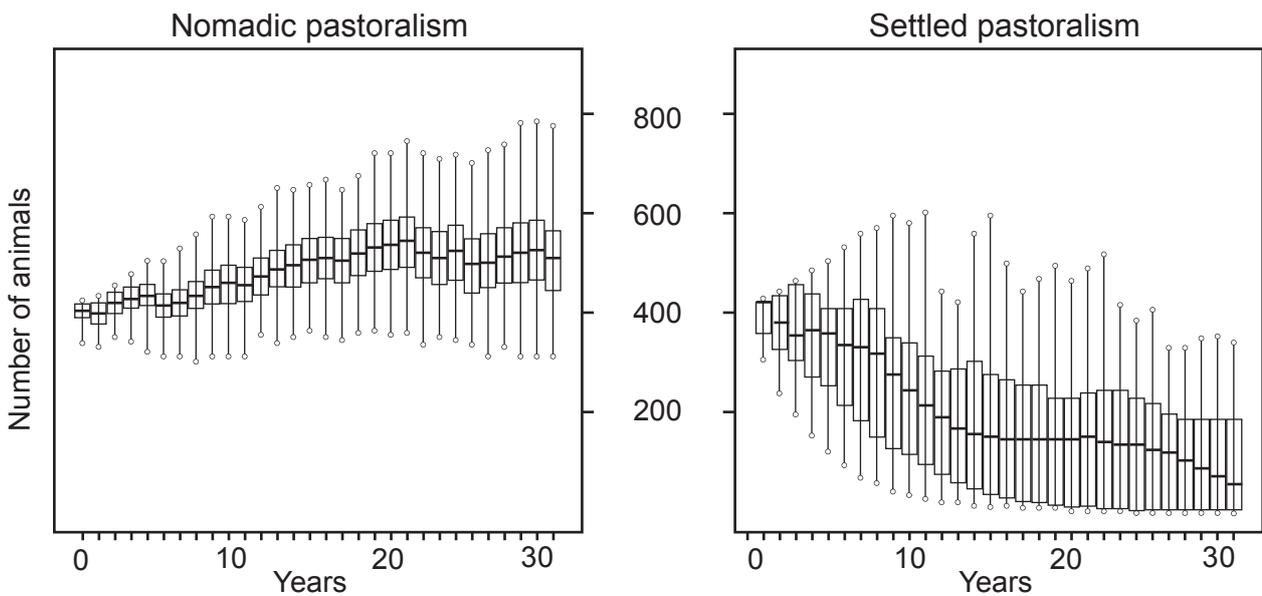
Figure 7d: Costs of ecosystem restoration

[Source: www.circleofblue.org]

Figure 8a: Roads in the Mongolian Steppe

[Source: www.suiri.tsukuba.ac.jp]

Roads in the steppe are often no more than sandy tracks. Drivers overtaking or passing other vehicles can go off the track and cause damage to the vegetation. Over time tracks become recolonized with vegetation.

An ecological study was undertaken to compare three tracks in the steppe. Two abandoned tracks were selected (Track B and Track C), which were in parallel next to the current track (Track A), to investigate the recovery of vegetation.

Each investigated track extended over 500m and was 2–3m in width. An additional site (D) was also investigated.
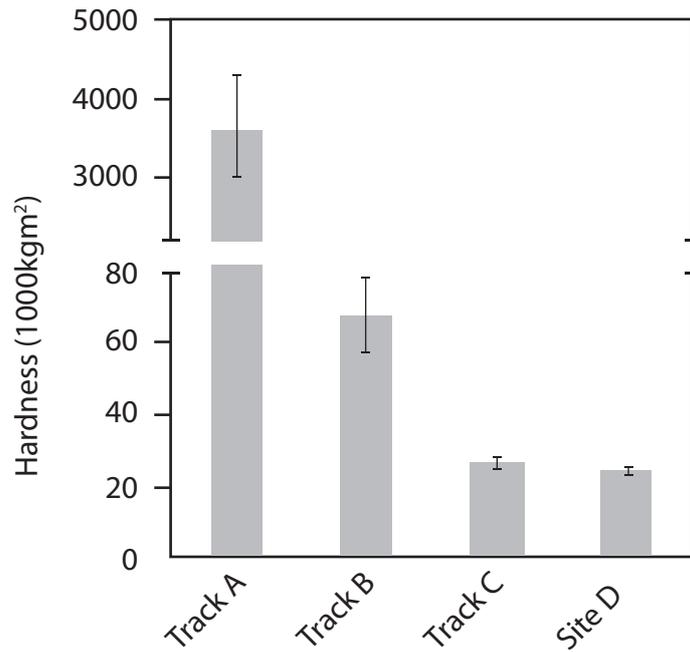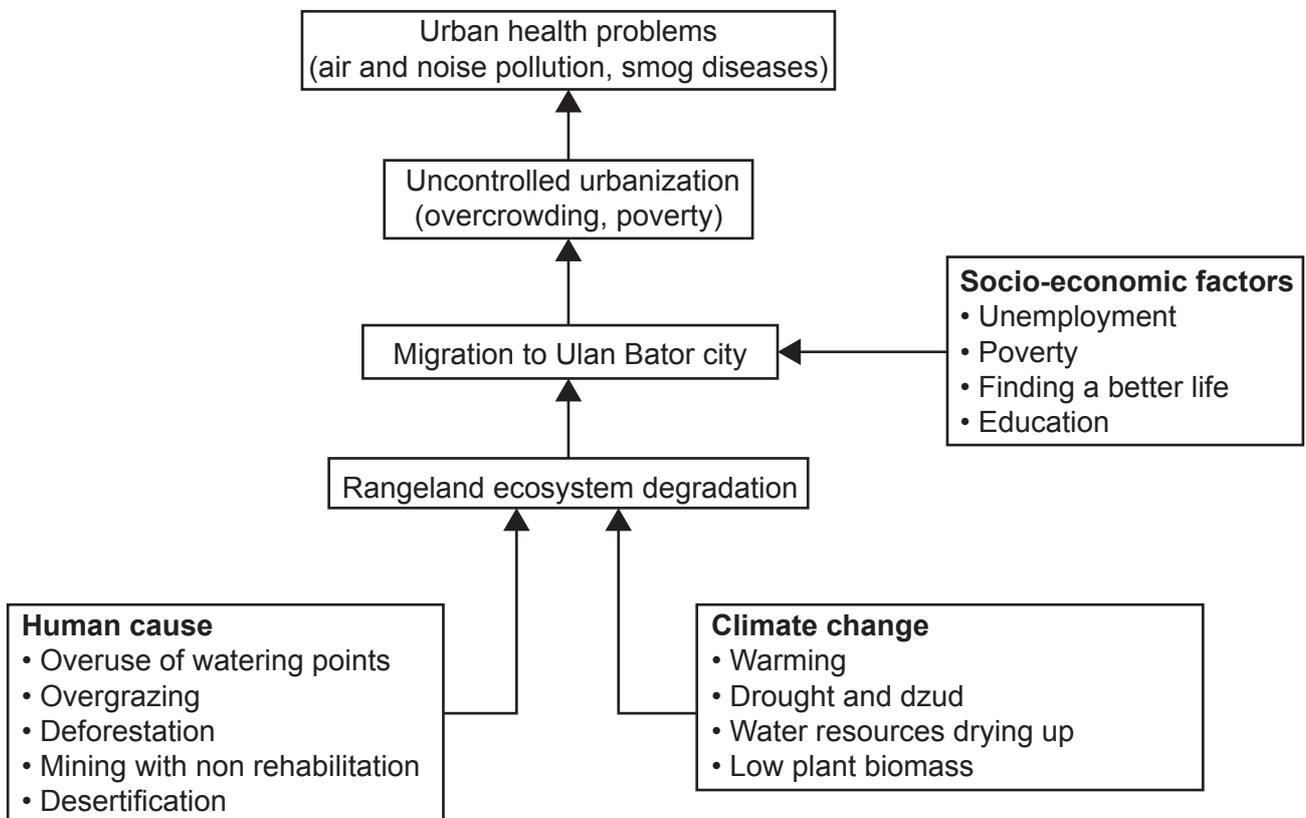
Figure 8b: Variation of soil hardness

Figure 9: Environmental unsustainability in Mongolia

[Source: Davaanyam Surenjav "Dry rangelands degradation, migration, uncontrolled urbanization and urban health in mongolia" 2008]

Figure 10: Snow Leopard Trust

Snow leopard population:
- 500–1,000 (2nd largest population in the world).

Threats to snow leopards:
- poaching for trade in hides or bones
- revenge killing for livestock loss
- mining in snow leopard habitat.

Mission and conservation philosophy
The Snow Leopard Trust started working in Mongolia in 1992. It builds community partnerships by using science to determine priorities for protecting the endangered snow leopard:
- understanding snow leopard behavior and habitat
- listening to the community to identify needs
- seeking resources for sustaining long-term programs.
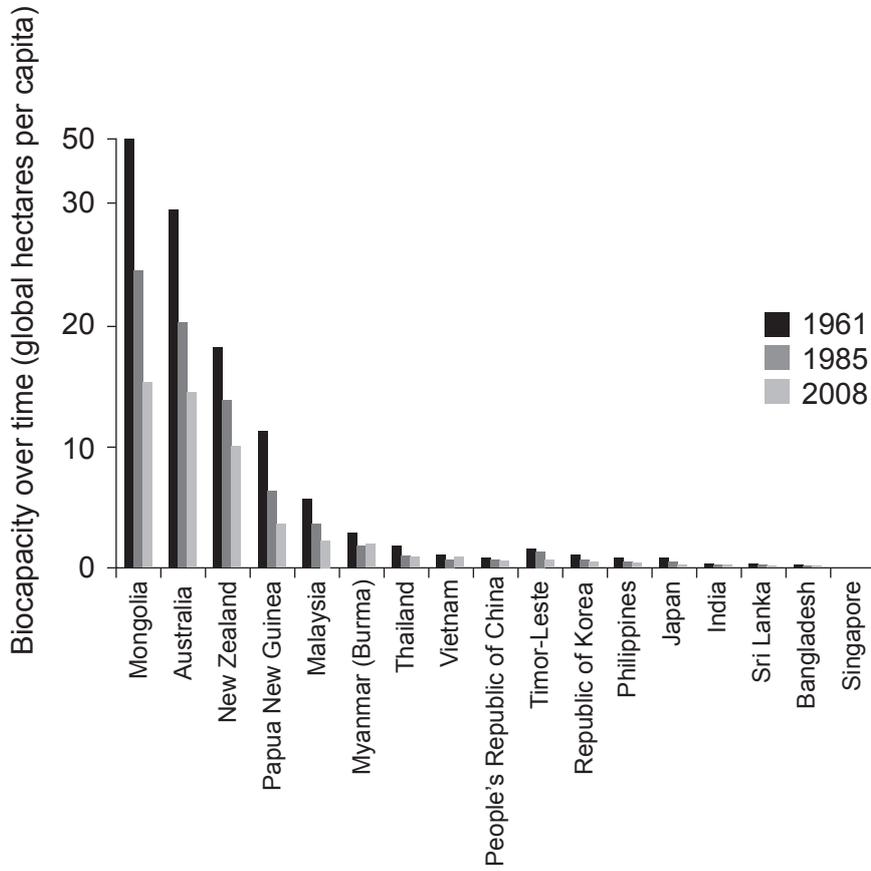
Conservation methods:
- Snow leopard businesses (local women sell handmade snow leopard dolls to increase incomes)
- Livestock Insurance (financial compensation given to herders who lose an animal to snow leopard predation)
- Research center set up to study ecosystem
- Cameras, satellite tracking, GPS tracking collars
- Genetic research.

Landscape Focus Area: one landscape area (approximately 4000 km^2) where conservation and research efforts are focused.

[source: © Snow Leopard Trust]

Turn over

Figure 11: Biocapacity for different countries

Biocapacity can be defined as the amount of biologically productive land, measured in global hectares per capita.

[Source: http://assets.panda.org]