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Environmental systems and societies
Standard level
Paper 1 – resource booklet

Friday 28 October 2022 (afternoon)

1 hour

Instructions to candidates

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

Figure 1(a): World map showing location of Japan



Figure 1(b): Map showing location of the island of Hokkaido



Figure 2(a): Fact file on the island of Hokkaido

- The main city is Sapporo.
- The island contains 20% of Japan's land area.
- The population is 5 286 000 (2018), which represents 5% of Japan's population.
- 31% of the inhabitants are over the age of 65 years (2018).
- It is home to the indigenous Ainu people.
- It is Japan's largest producer of rice, soybeans and wheat.
- It is known for nature and recreational tourism, e.g. hiking, bear-watching.
- It has 198 ski resorts.
- It receives over two million national tourists each year.

Figure 2(b): Climate graph for Sapporo, Hokkaido

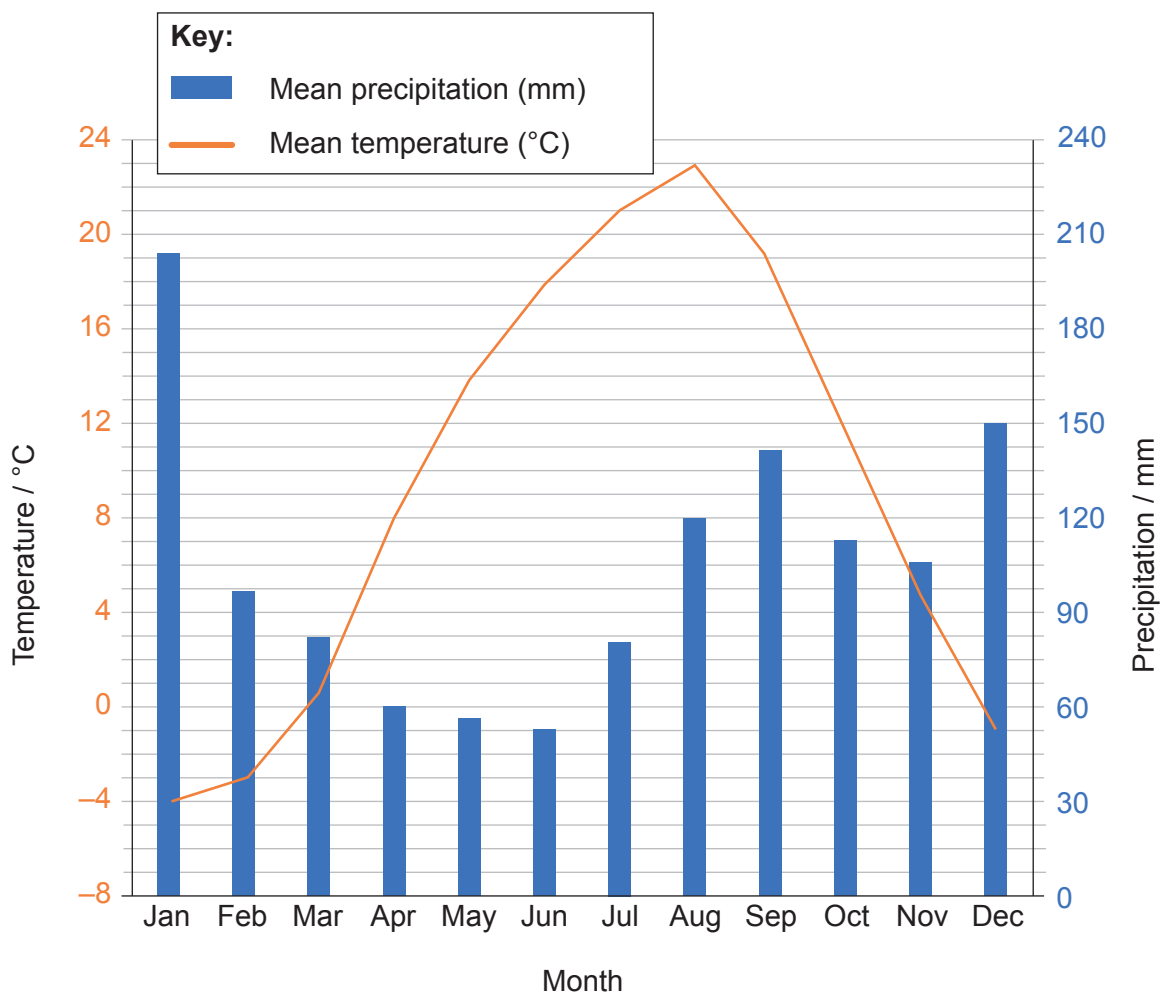


Figure 2(c): Elevation map of the island of Hokkaido

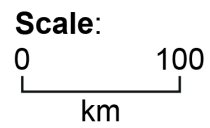
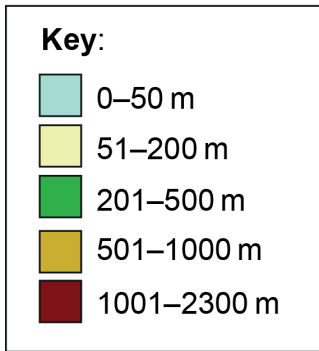
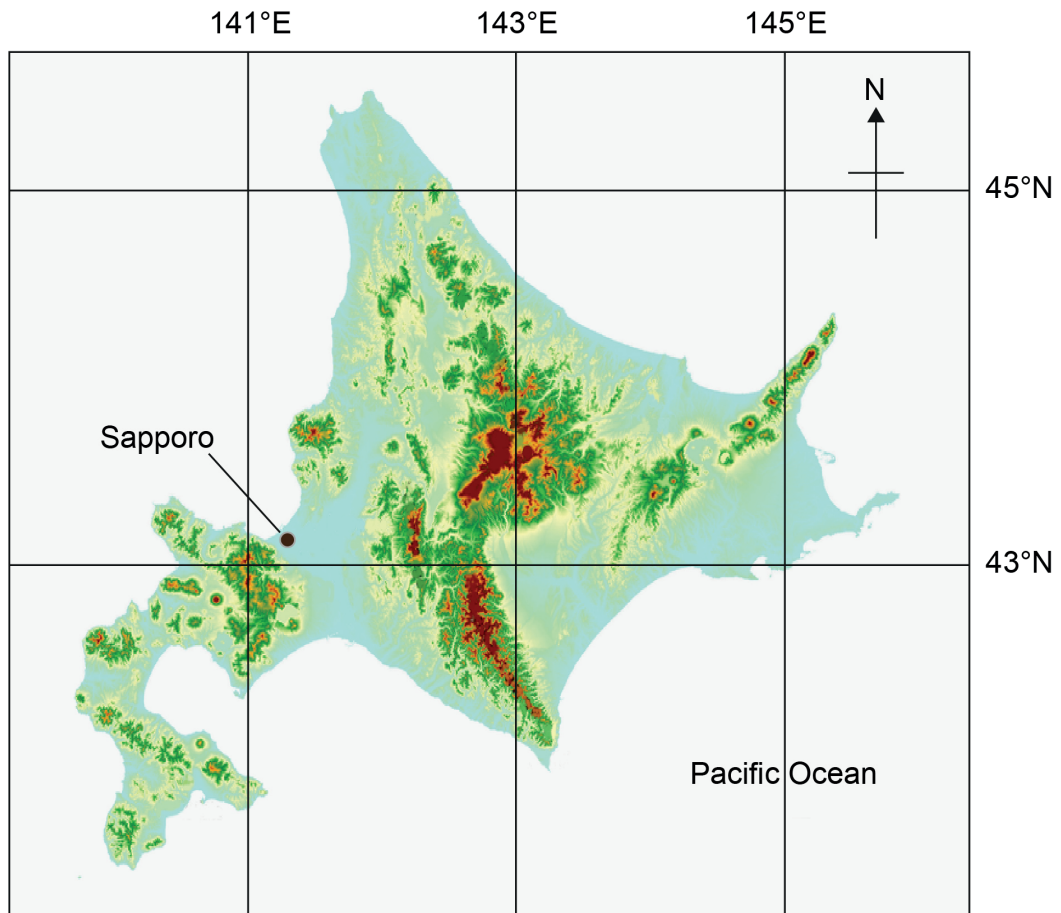


Figure 3(a): Fact file on the island of Hokkaido's national parks

- Hokkaido has six of Japan's 34 national parks.
- 10% of the land area is protected.
- Many birds, amphibians, butterflies and mammals are endemic subspecies.
- Approximately 25% of hiking trails in the two most popular national parks, Shikotsu-Toya and Daisetsuzan, have been heavily degraded due to intensive use.

Figure 3(b): Map of Hokkaido's national parks

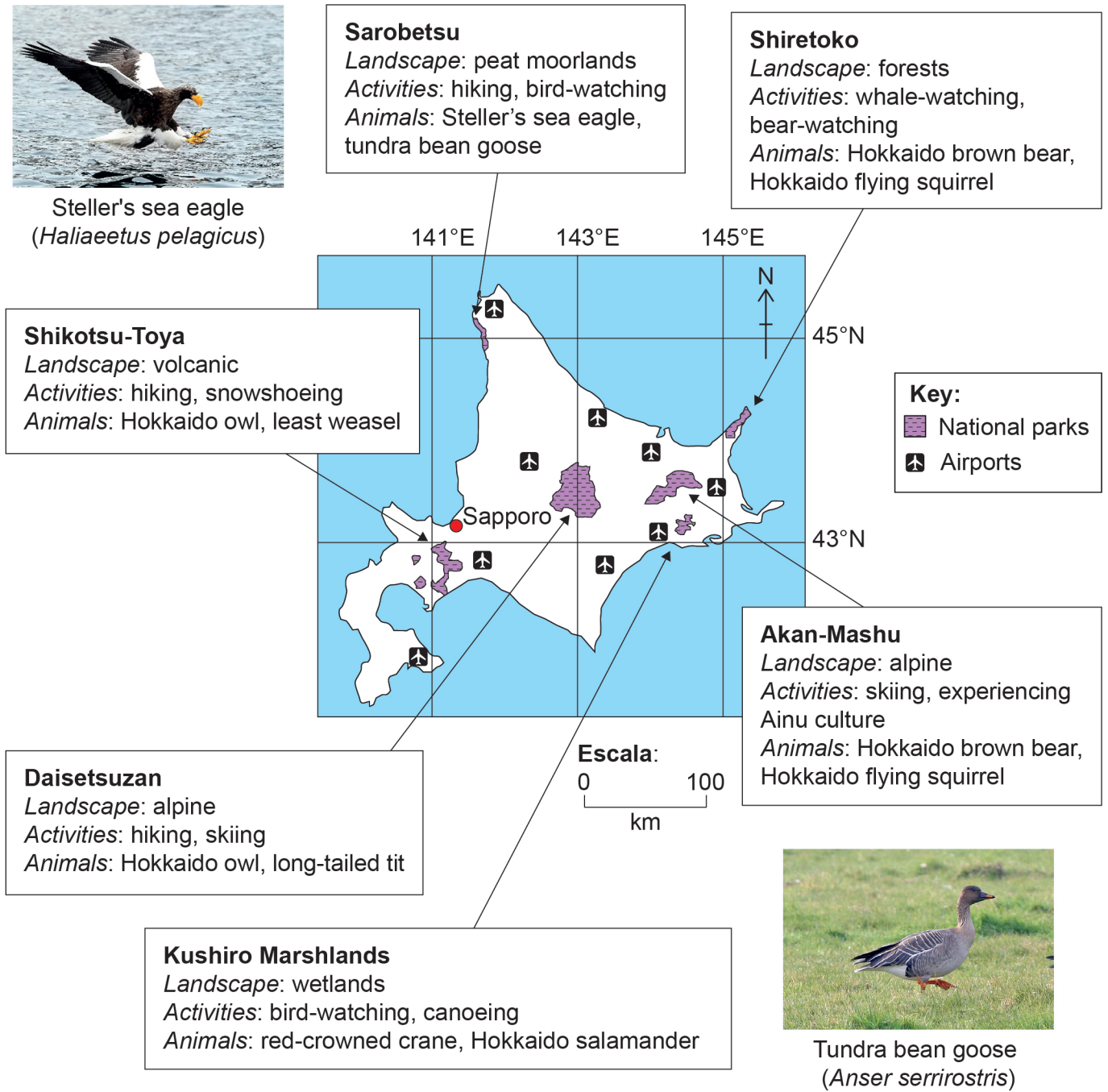


Figure 4: International tourist arrivals to Hokkaido

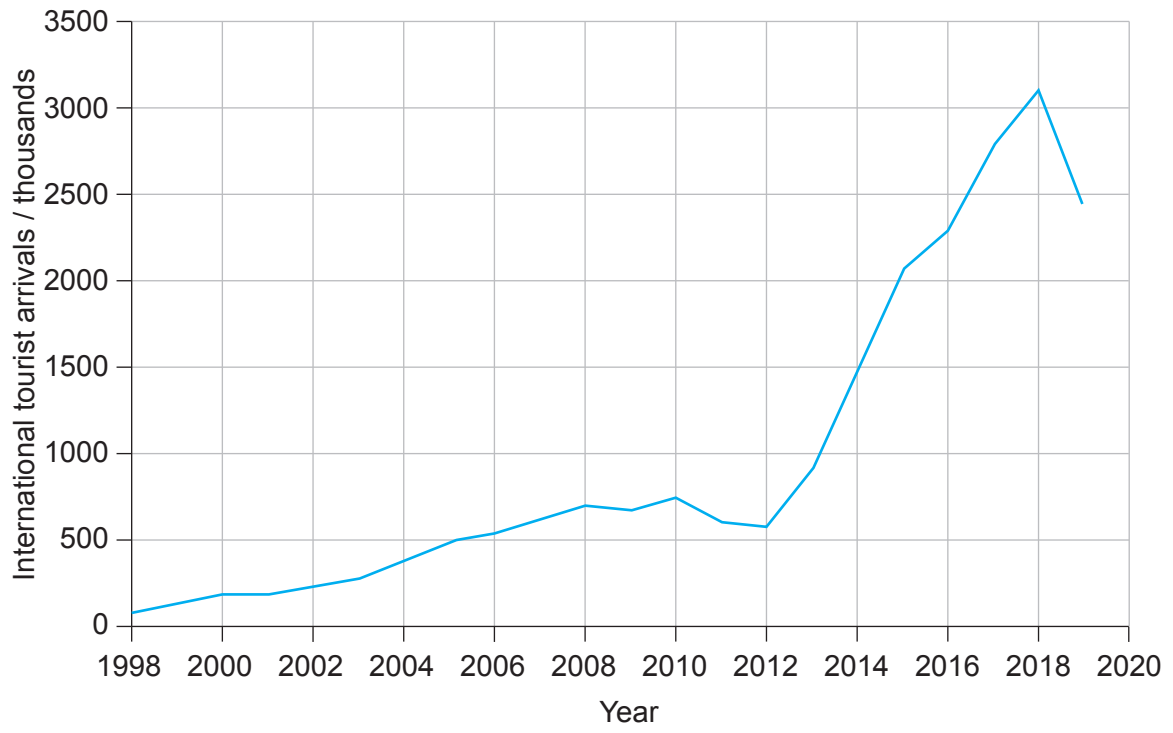


Figure 5: A simplified food web on Hokkaido

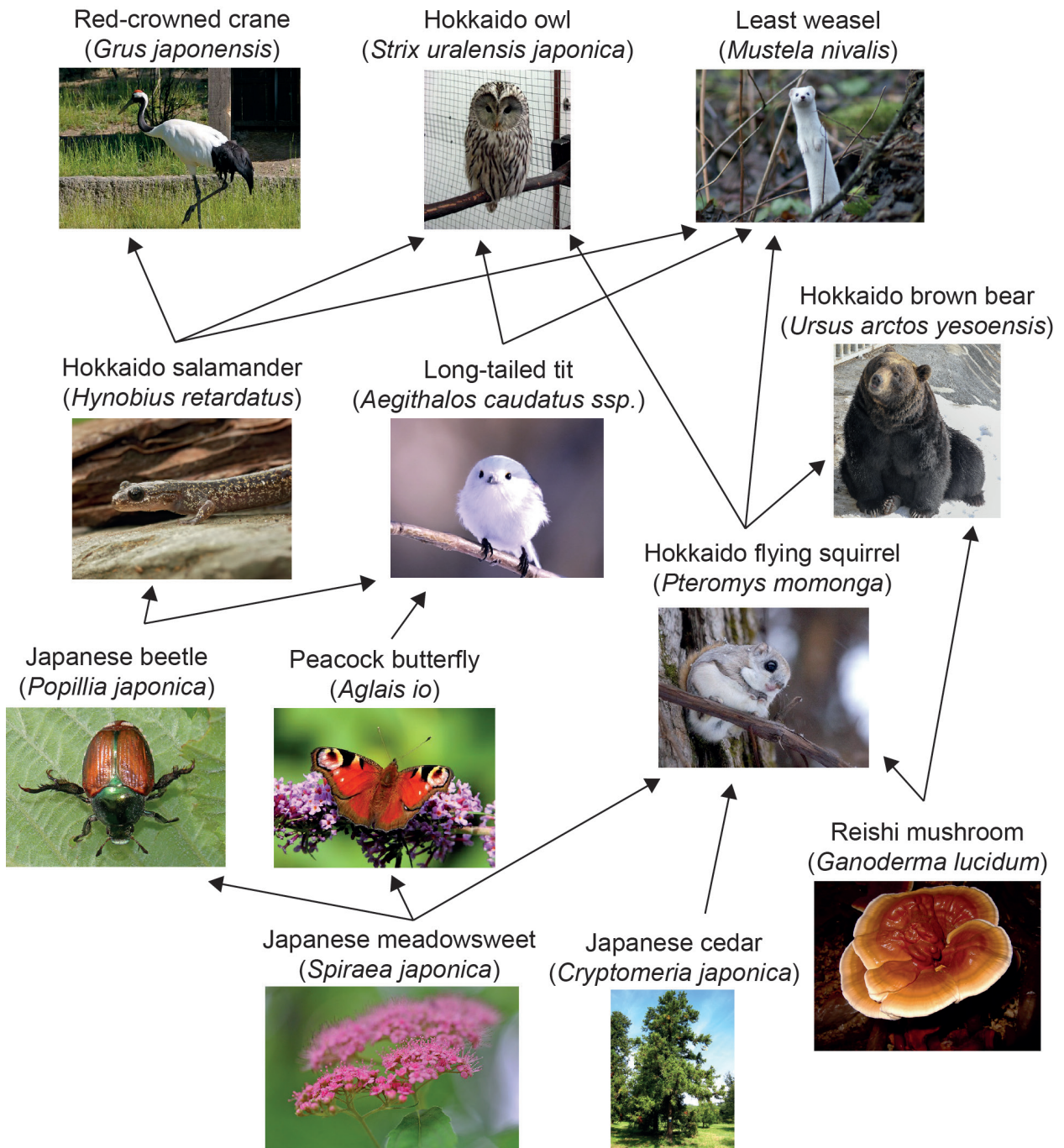


Figure 6(a): Fact file on red-crowned cranes

- In 2000, the IUCN listed red-crowned cranes as Endangered.
- In 2020, the IUCN made a recommendation to change their status from Endangered to Vulnerable.
- 50% of the world's population is found on Hokkaido.
- Breeding in captivity has been unsuccessful.
- They are protected from hunting across their entire habitat.
- Habitat loss has occurred because wetlands have been drained for agriculture.
- They feed on fish, frogs and salamanders in wetlands, and cereal crops and insects in agricultural areas.
- They are considered pests by some farmers as they eat cereal crops.
- The Kushiro Marshland National Park workers provide additional food in winter.
 - Winter feeding stations in the park are overcrowded.
- On Hokkaido, red-crowned cranes have stopped migrating and have become permanent residents.
 - The resident population on Hokkaido has lower genetic variability than the migratory Eurasian population.

Figure 6(b): Population graph of mature red-crowned cranes

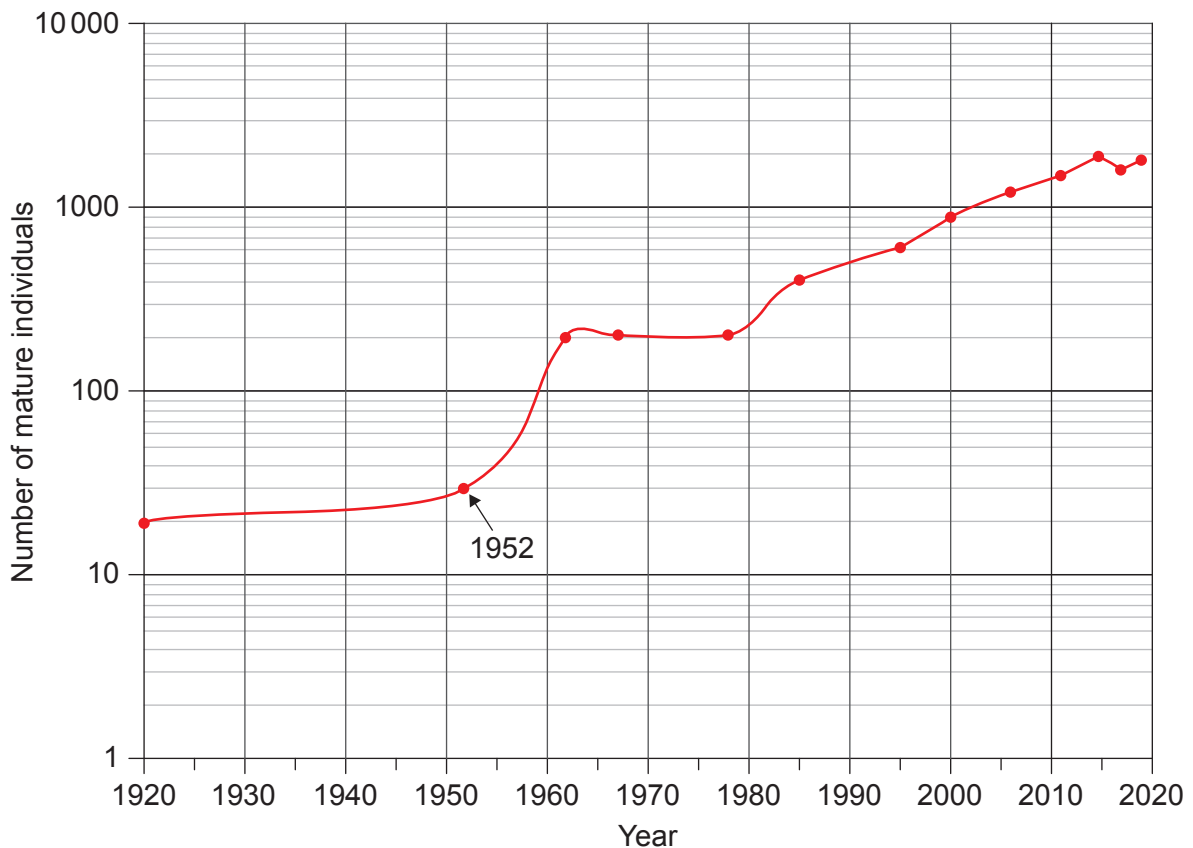


Figure 7(a): Fact file on Hokkaido's forests

- Since the 1950s, natural forests have been replaced by coniferous forest monocultures.
- 71 % of the land area is forest.
- 30% of the forest area in Hokkaido is coniferous forest monoculture.
- In 2006, a plan was proposed to return one third of coniferous forest monocultures to natural forests or grasslands:
 - to protect biodiversity,
 - to protect aquatic recharge areas,
 - to improve recreational opportunities.

Figure 7(b): Natural forests and coniferous forest monocultures in Japan

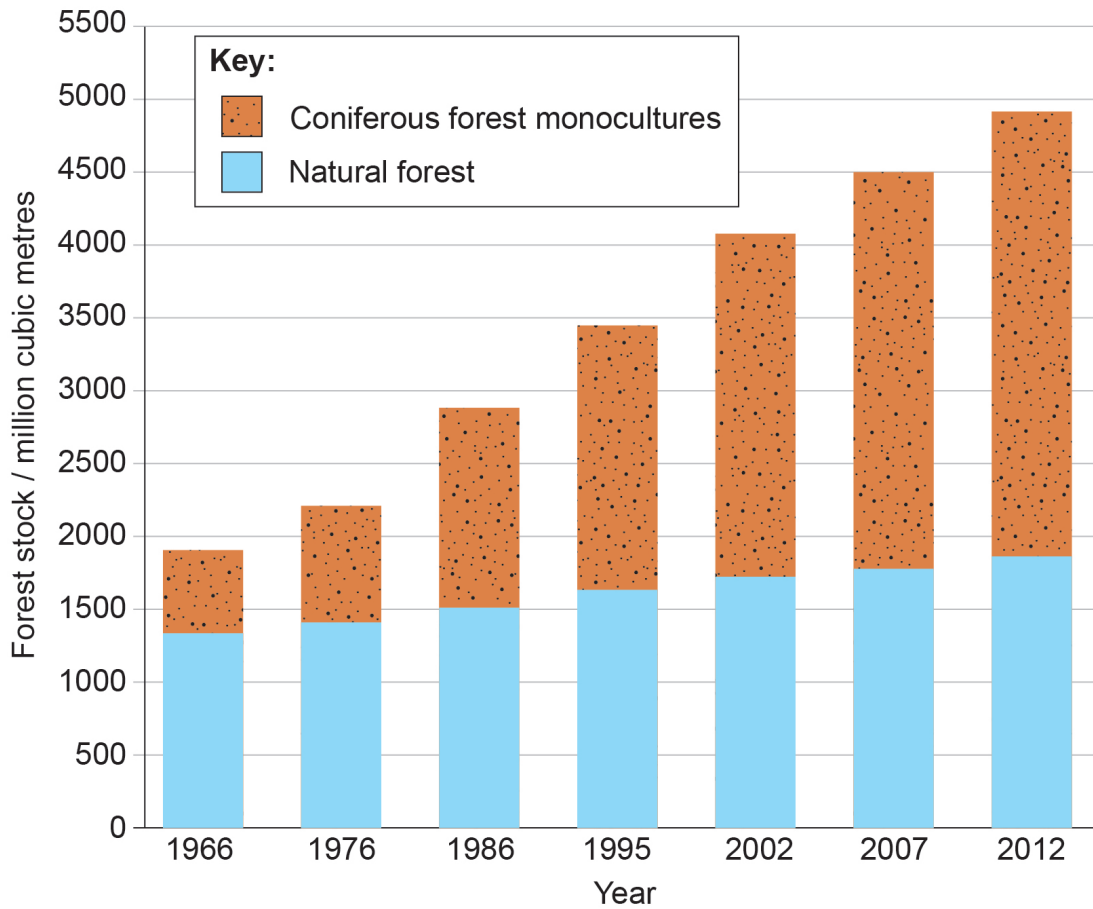


Figure 8(a): Demographic data for Japan and Hokkaido (2018)

Region	Fertility rate (live births per woman)	Birth rate (births per thousand)	Death rate (deaths per thousand)
Japan	1.40	7.39	10.97
Hokkaido	1.28	6.21	12.22

Figure 8(b): Age-gender pyramid for Hokkaido (2018)

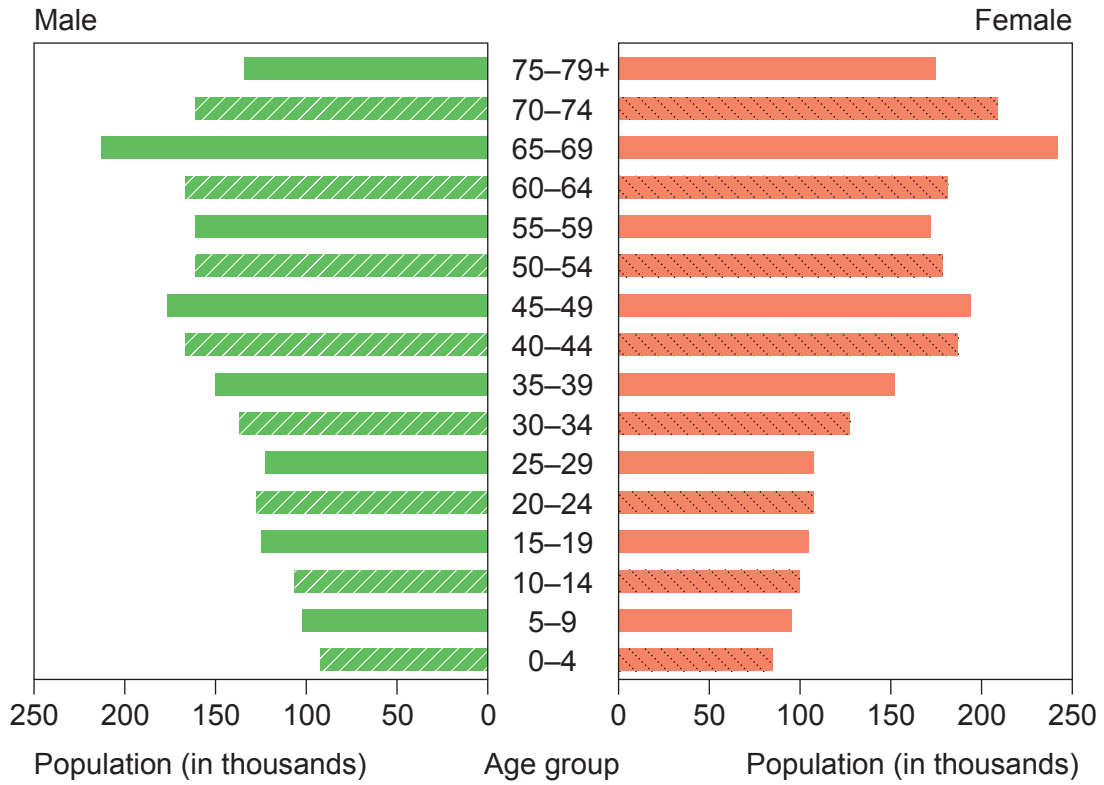
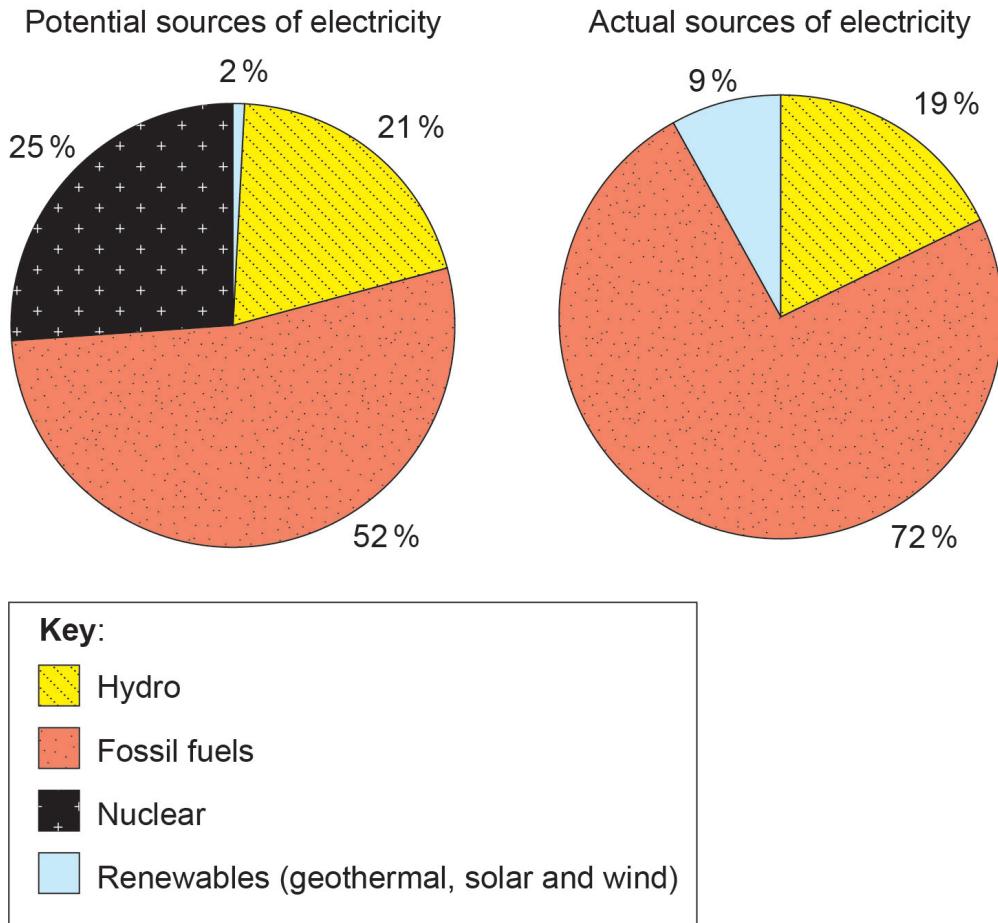


Figure 9(a): Fact file on Japan's energy

- Japan aims to reduce CO₂ emissions by 26 % by 2030 to meet its Paris Agreement targets.
- Japan is resource-poor in terms of fossil fuels.
- Japan imports 94 % of the energy it needs.
- All potential hydroelectric sites have already been developed.
- All future developments for electricity generation require an Environmental Impact Assessment (EIA).

Figure 9(b): Sources of Hokkaido's electricity in 2017



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References:

- Figure 2(c)** Fig 1. Sampling location of Hokkaido salamanders. From: *Population Structure and Evolution after Speciation of the Hokkaido Salamander*. © 2016 Matsunami et al. Under copyright and licensed under the Creative Commons Attribution 4.0 International license. <https://creativecommons.org/licenses/by/4.0/>. Image cropped, recoloured and reannotated.
- Figure 3(b)** Map from Cedars Communication Co. Ltd., n.d. Hokkaido for 10,000 Yen! [image online] <https://uu-nippon.com/hokkaido/air/timetable/index.shtml> [Accessed 13 September 2020].
- Adult Steller's sea eagle fishing. Image by Julie Edgley. https://commons.wikimedia.org/wiki/File:Adult_Steller%27s_sea_eagle_fishing.jpg. Under copyright and licensed under the Creative Commons Attribution-Share Alike 4.0 Generic license. <https://creativecommons.org/licenses/by-sa/4.0/deed.en>.
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- Figure 4** This information uses open data from Hokkaido. Hokkaido Tourist Statistics Data: www.pref.hokkaido.lg.jp/kz/kkd/. Hokkaido Open Data CC-BY 4.0. <https://creativecommons.org/licenses/by/4.0/>. [Accessed 3 September 2020].
- Figure 5** Red-crowned crane. Image by Ryan Poplin. <https://www.flickr.com/photos/poplinre/611664347/>. Under copyright and licensed under the Creative Commons Attribution-ShareAlike 2.0 Generic license. <https://creativecommons.org/licenses/by/2.0/deed.en>.
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<https://www.flickr.com/photos/121131556@N06/19345862096/>.

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Figure 7b Created by International Baccalaureate Organization based on *Annual Report on Forest and Forestry in Japan* (Ministry of Agriculture, Forestry and Fisheries) (<https://www.maff.go.jp/e/data/publish/attach/pdf/index-95.pdf>).

Figure 8a Table data created by the International Baccalaureate Organization using statistics from the Portal Site of Official Statistics of Japan website (<https://www.e-stat.go.jp/>)—System of Social and Demographic Statistics Prefectural Data Basic Data (for 2018)—under Creative Commons Attribution License 4.0. <https://creativecommons.org/licenses/by/4.0/>. [Accessed 13 August 2020].

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