

令和6年度特色入試問題

《 農学部 森林科学科 》

小論文試験

200点満点

(注 意)

1. 問題冊子および解答冊子は係員の指示があるまで開かないこと。
2. 問題冊子は表紙のほかに8ページある。
3. 解答冊子は表紙のほかに10ページある。なお、別に下書き用紙8ページを配布する。
4. 試験開始後、解答冊子の表紙所定欄に受験番号・氏名をはっきり記入すること。
表紙には、これら以外のことを書いてはならない。
5. 解答はすべて解答冊子の指定された箇所に記入すること。
6. 解答に関係のないことを書いた答案は無効にすることがある。
7. 解答冊子は、どのページも切り離してはならない。
8. 問題冊子および下書き用紙は持ち帰ること。解答冊子は持ち帰ってはならない。
9. 解答は日本語で記入すること。

問題 1 以下の英文を読み、問 1 ～ 5 について、解答用紙の所定の欄に収まるように答えなさい。(100 点)

The ancient predation^{*1} was the first of three periods of severe deforestation in Japan's history. The other two were the early modern, which occurred from 1570 to 1670, and the modern, of the first half of the twentieth century. The first predation was the least severe of the three, with damaging deforestation largely confined to woodlands^{*2} of the Kinai basin^{*3} (Map).

Prior to the ancient predation, millennia of Stone Age forest utilization had made little lasting impact on the archipelago's^{*4} woodland. ① Eventually, however, field crops, including most notably^{*5} rice, were introduced to Japan, and by about 300 B.C. rice culture was well established in the west. During the next several hundred years cultivation spread across the islands as far into the northeast as available varieties of grain would grow. The forest clearance that permitted this diffusion was humankind's first dramatic and permanent modification of Japanese woodland.

Not long after the establishment of rice culture, both bronze and iron appeared in Japan. Initially, metal implements were brought from the continent, but by A.D. 200 or so smelting^{*6} was practiced in the islands. It required substantial volumes of high-quality charcoal^{*7}, which was made from oak, chestnut, or other dense hardwoods^{*8}. The products of the blacksmith^{*9}, in turn, gave the Japanese powerful new tools with which to expand their assault^{*10} on the forests.

The diffusion of iron tools proceeded slowly, as sources of ore^{*11} were located and techniques of production mastered. As villagers^{*12} accumulated wealth enough to acquire the new types of tools, stone implements were gradually replaced. New cultivating tools, such as metal hoes and spades^{*13}, enabled tillers^{*14} to work appreciably greater acreages^{*15} of grain. And iron adzes, axes, chisels, drills, hammers, hatchets, planes, nails, wedges^{*16}, and, somewhat later, small saws allowed them to clear more brush, fell larger trees, and process the wood more rapidly and skillfully into construction timber, larger dugout boats^{*17}, and household and production tools and implements. The new woodworking tools enabled tillers to split and shape wood to make walls and irrigation ditches and dams for their rice fields and to build elevated warehouses^{*18} in which harvested grain could be stored, safe from rodents and mildew^{*19}.

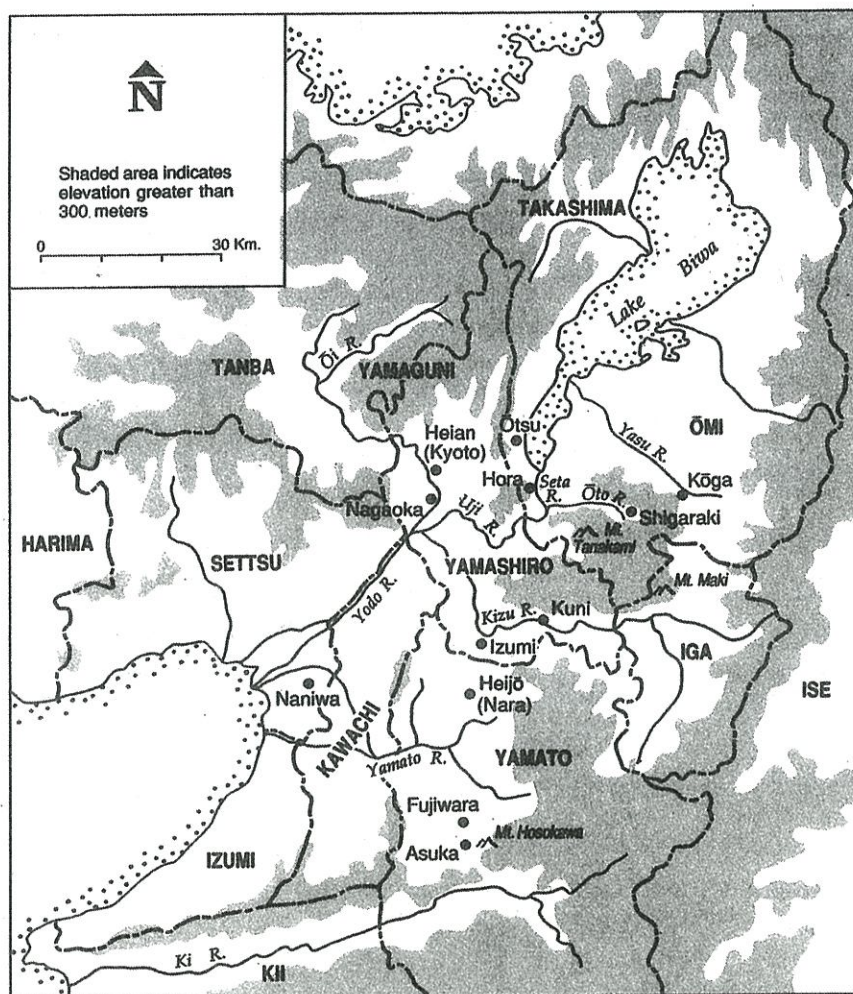
Agriculture and metallurgy^{*20} were the human innovations that most dramatically affected prehistoric^{*21} Japanese forests. But other developments of A.D. 300-600 added to the intensity of human-forest relations. Horse-mounted warriors armed with swords, spears, and bows and arrows; protected by metal slat armor; and commanding armies of pike-carrying foot soldiers undertook political consolidation^{*22}. Their need for weapons expanded the demand for smithing charcoal, and their steeds^{*23} required forage, much of which came

from woodland. As leaders gained power, moreover, they erected larger, wooden-stockaded headquarters and celebrated their accomplishments by building grand residences. To facilitate military operations, they adopted shipbuilding techniques from the continent, using plank^{*24} construction to form seagoing vessels each capable of carrying scores of fighting men. And after they died, they were buried in carefully constructed wooden coffins^{*25} of choice water-resistant woods, preferably kōyamaki^{*26}. Each coffin, together with artifacts of the fallen leader's life, was placed in a great burial mound (kofun) whose size reflected its occupant's power, the greatest rivaling the pyramids of Egypt and Mesoamerica^{*27}. The mounds were then lined with prodigious^{*28} numbers of pottery cylinders and figurines, whose firing alone must have consumed great quantities of fuel.

②Thus, by A.D. 600 the people of Japan were using woodland much more intensively than a millennium earlier and were establishing the basic characteristics of the archipelago's human-forest relationship as it would survive until the twentieth century. Villagers needed cleared land for tillage^{*29}. They needed well-wooded uplands to assure adequate water for paddy culture. And they needed woodland to provide various types of building materials, fuel, fodder^{*30}, and natural food supplies. In subsequent centuries they would add only one major forest demand: green fertilizer material, which eventually surpassed all the others in political importance. The rulers needed fodder for their steeds, fuel for forging^{*31} weapons and for domestic uses, and most of all, timber for their vessels, fortifications^{*32}, private and public buildings, and other implements of war and peace.

Around A.D. 600 Japan's ruling elite initiated the ancient predation, employing new principles of political and economic organization and new styles of architecture in a construction boom of extraordinary magnitude. In the process they established the character of Japanese buildings for the next 1,250 years. A rash of construction projects endowed the country with a string of small provincial headquarters and dotted the Kinai basin with a plethora of great monasteries, shrines, palaces, and mansions^{*33}. Most of these were situated in or near Nara and Heian, the two successive capital cities whose back streets were lined with the crudely framed bark and wattle homes^{*34} of perhaps one hundred thousand to two hundred thousand urban commoners^{*35}.

The social and ecological consequences of this construction boom were profound. It appears that all the accessible old-growth stands in the mountains adjoining^{*36} the Kinai basin were felled. Because technical or political limitations or both precluded^{*37} the importation of large timber or great volumes of wood from more distant areas, the timber scarcity that followed the felling of Kinai woodlands led to modifications in construction practices, wood use, and forest use and management. ③The intensive logging, together with an escalating demand for fuel and fodder, permanently changed the vegetation in parts of Ōmi, Yamashiro, and Yamato provinces^{*38}, and these changes gave rise to wildfire, flooding, and erosion^{*39}, which elicited^{*40} tentative measures of forest protection and rehabilitation.



Map. The Kinai Basin. Based on *Nihon rekishi chizu* (map volume of *Nihon rekishi daijiten*; Tokyo: Kawade Shobo Shinsha, 1961), 7.

語注： *1 predation: 収奪、*2 woodlands: 森林、*3 Kinai basin: 畿内（奈良時代における大和国・山城国・河内国・和泉国・摂津国の範囲、現在の京都・奈良・大阪）の盆地、平野部、*4 archipelago's: 列島の、*5 notably: 顕著に、*6 smelting: 精錬、*7 charcoal: 木炭、*8 oak, chestnut, or other dense hardwoods: カシ、クリ、その他の堅い広葉樹、*9 blacksmith: 鍛冶屋、*10 assault: 急激な伐採、*11 ore: 鉱石、*12 villagers: 村人たち、*13 metal hoes and spades: 鉄製の鋤（くわ）と鋤（すき）、*14 tillers: 農夫たち、*15 acreages: 面積、*16 iron adzes, axes, chisels, drills, hammers, hatchets, planes, nails, wedges: 鉄製の手斧（ちょうな）、鉞（まさかり）、鑿（のみ）、錐（きり）、金槌（かなづち）、鉈（なた）、鉋（かんな）、釘（くぎ）、楔（くさび）、*17 dugout boats: 丸木舟、*18 warehouses: 倉庫、*19 rodents and mildew: ねずみとカビ、*20 metallurgy: 冶金、*21 prehistoric: 先史時代の、*22 consolidation: 強化すること、*23 steeds: 軍馬、*24 plank: 厚板、*25 coffins: 棺（ひつぎ）、*26 kōyamaki: コウヤマキ（高野槇）常緑針葉樹、*27 Mesoamerica: 中米、*28 prodigious: 莫大な、*29 tillage: 耕作、*30 fodder: 飼い葉、*31 forging: 鍛造、*32 fortifications: 要塞をつくること、*33 a plethora of great monasteries, shrines, palaces, and mansions: 豪華な寺院、神社、宮殿、御殿、*34 crudely framed bark and wattle homes: 樹皮や編み枝で造られた粗末な家屋、*35 commoners: 庶民、*36 adjoining: 隣接する、*37 precluded: 不可能にする、*38 Ōmi, Yamashiro, and Yamato provinces: 近江国、山城国、大和国、*39 erosion: 土地の浸食、*40 elicited: 導き出す

出典：Conrad Totman (1998) Chapter One: The Ancient Predation, 600-850 in “The Green Archipelago: Forestry in Pre-Industrial Japan” pp 9-11, Ohio University Press, Athens, USA. より一部改変・抜粋

- 問1 下線部①を日本語に訳しなさい。
- 問2 先史時代の日本で、最も森林を減少させた社会の変化は何だったか、項目を2つ挙げて説明しなさい。
- 問3 下線部②で示した段落では、西暦600年頃までに日本人の森林資源の消費がそれまでより急激に増大したことが述べられている。村人の森林資源の利用や消費の目的を説明しなさい。
- 問4 西暦600年以降、支配階級の人びとの活動に起因する森林資源の消費がそれ以前よりも著しく増大した。この原因を論じなさい。
- 問5 下線部③では、西暦600年頃から始まった森林資源の急激な消費によって、近江国、山城国、大和国の一部地域で植生が完全に変わったと述べられている。この時代において森林資源を持続的に利用するためにはどのような方法が必要であったかを論じなさい。

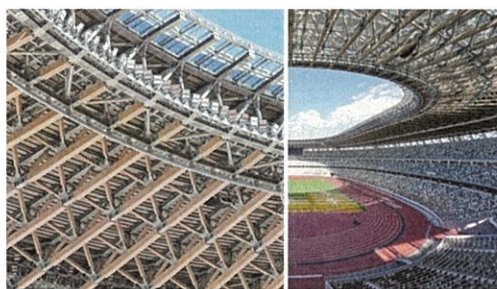
問題2 「地球規模での炭素吸収源 (carbon sink) としての建築物」に関する以下の英文を読み、問1～5について、解答用紙の所定の欄に収まるように答えなさい。(100点)

英文は出典のみ公開する。

出典：Churkina, G., Organschi, A., Reyer, C.P.O. *et al.* Buildings as a global carbon sink. *Nature Sustainability* 3, 269-276 (2020).
(<https://doi.org/10.1038/s41893-019-0462-4>, 2023年6月11日参照) より一部改変・抜粋

glulam とは Glued Laminated Timber

(集成材) の略称で、耐久性、耐湿性のある接着剤で繊維方向が長手方向に平行になるように接着された構造用木材。大型の梁として国立競技場の屋根材にも用いられている。



glulam の一例

出典：「国立競技場」における木材利用の取組

(林野庁 HP、https://www.rinya.maff.go.jp/j/riyou/kidukai/tokyo2020_kinokuni_kokuritsu.html、2023年6月11日参照) より一部改変・抜粋

CLT とは Cross Laminated Timber (直交集

成板) の略称で、ひき板を並べた後、繊維方向が直交するように積層接着した構造用木材。厚みのある大きな板で、建築の壁や床などの構造材の他、土木用材などにも使用される。1995年頃からオーストリアを中心として発展し、現在では、ヨーロッパ・北米を中心に高層建築が建てられるなど、CLTの利用は近年になり各国で急速な伸びを見せている。



CLT の一例

出典：CLT とは (一般社団法人日本 CLT 協会 HP、<https://clta.jp/clt/>、2023年6月11日参照) より一部改変・抜粋

問 1 下線部①について、工業化以前には建造物の主材であった丸太や製材品の利用は、その後どうなったか、本文に沿って説明しなさい。

問 2 下線部②に述べられているように、木材は燃えやすいにも関わらず、glulam や CLT が 18 階建て建造物の防火基準をクリアできる理由を、本文に沿って説明しなさい。

問 3 下線部③を日本語に訳しなさい。

問 4 Fig. 1 が意図する内容を、本文を参考にしてまとめなさい。

問 5 Fig. 1 の内容をふまえ、わが国における木材利用のあるべき姿について、あなたの意見を述べなさい。

問題訂正（農学部森林科学科 小論文試験）

下記の問題訂正があります。

記

問 題 訂 正

農学部 森林科学科 小論文試験 問題冊子

問題1 3ページ 下から6行目

(誤) 豪華な寺院、

↓

(正) 非常に多くの豪華な寺院、

4ページ 上から4行目

(誤) 問3 下線部②で示した段落では、・・・

↓

(削除)

(正) 問3 下線部②では、・・・

問題2 5ページ 下から12行目

(誤) ① The use ... → (正) ① The use ...

6ページ 上から9行目

(誤) ② Extensive ... → (正) ② Extensive ...