

STUDENT WORKSHEETS



WORKSHEET 1: HUMAN ALTERATIONS TO THE TEMPERATE BIOME FOR ZUCCHINI PRODUCTION

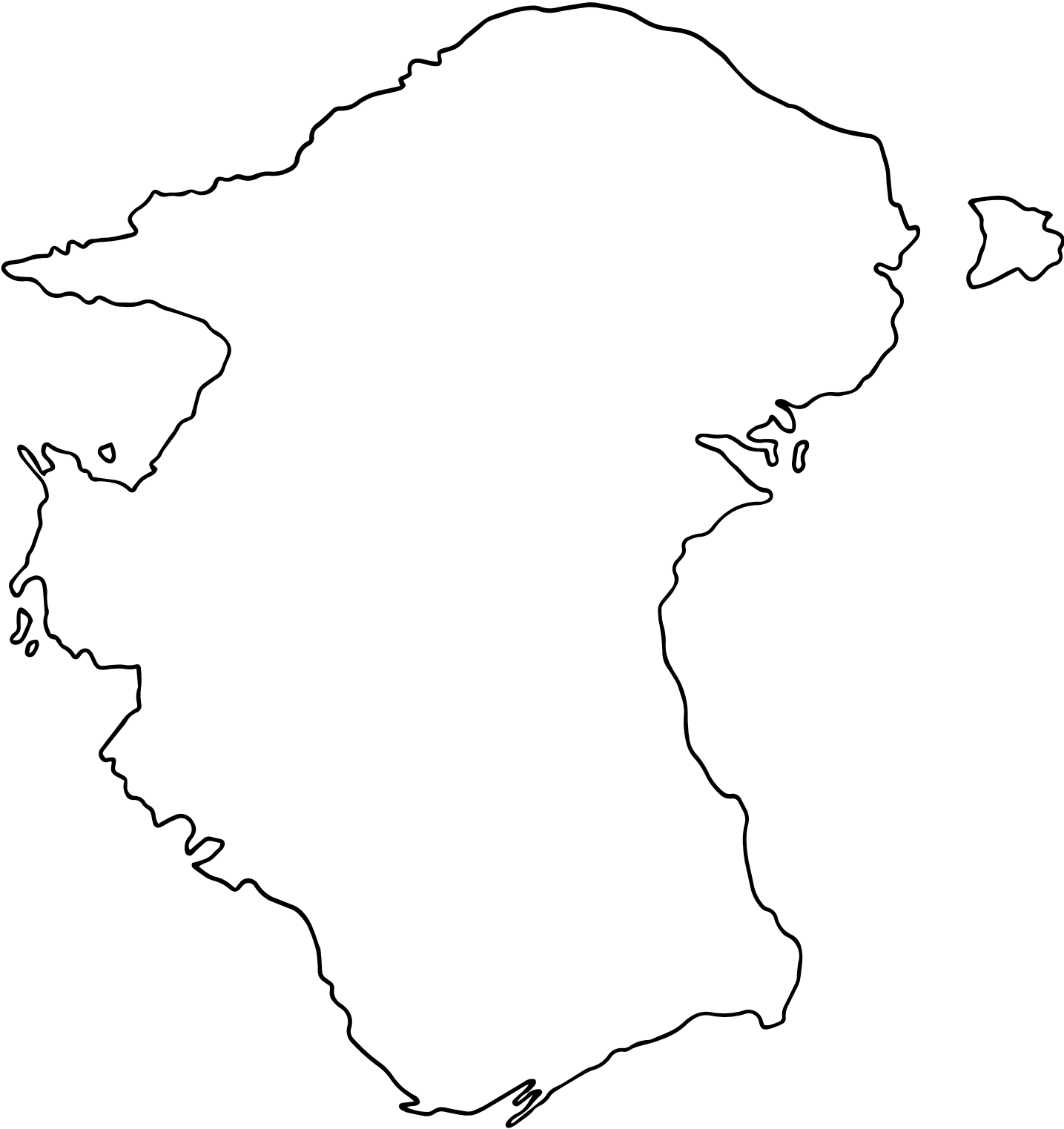
Name:

1. How have modern irrigation systems benefited zucchini production in the temperate biome?

2. How do land management strategies like crop rotation, mulching, and selective land clearing contribute to both productivity and ecological balance in temperate zucchini farming regions?

3. Describe the geographical features of the temperate biome in Australia. What features of this biome make the region suitable for growing zucchinis?

**APPENDIX 1:
BLANK MAP OF AUSTRALIA**



APPENDIX 2: BIOME REFERENCE GUIDE



Access and explore the following webpage before completing the mapping activity.

<http://www.bom.gov.au/climate/maps/averages/climate-classification/?maptype=kpng>

There are six major groups and 27 sub-groups of climate zones across Australia. These climate zones are defined with the climatic limits of native vegetation in mind. This method of classification is based on the concept that native vegetation is the best expression of climate in an area.

The six major classes are identified predominantly on native vegetation type, with the additional sub-groups taking into consideration seasonal distribution of temperature and precipitation:

- Equatorial
- Tropical
- Subtropical
- Desert
- Grassland
- Temperate

Biomes are broad zones or regions of distinctive climate, plants, and animals. Biomes build distinct biological communities in conformity with the local physical environment and specific climate regime of a particular place.

Definition: A major terrestrial vegetation region, such as a tropical forest, temperate grassland or desert; similar biomes occur around the world in similar climatic zones (ACARA, 2025).

Formation: The climatic, as well as the physical regional background, facilitates the development of the biome.

Scale: Biomes can span across several continents and may include many ecosystems and habitats.

Diversity within Biomes: Each biome includes several ecosystems and a variety of habitats.

Classification debate: There is no consensus among scientists over how many biomes exist.

Some have described six major biomes: forest, grassland, freshwater, marine, desert, and tundra. Others have described eight, dividing forests into two categories and adding tropical savannah. Some classification schemes include as many as 11 distinct biomes.

This debate on classification underlines how complex the Earth's ecosystem is and the challenge of compartmentalising them into distinct units.

APPENDIX 3:

CASE STUDY - HUMAN ALTERATIONS TO THE TEMPERATE BIOME FOR ZUCCHINI PRODUCTION

Zucchini is a warm-season vegetable widely grown across Australia, particularly in temperate regions such as Victoria, New South Wales, and South Australia. Its popularity is due to its high yield, versatility, and ease of cultivation. However, successful zucchini production in these temperate biomes requires human intervention to modify natural conditions and optimise growing environments.



HUMAN ALTERATIONS TO THE TEMPERATE BIOME

Soil Preparation and Fertility Management

- **Soil Enrichment:** Natural temperate soils are often modified by adding compost and fertilisers to increase fertility and improve structure. This creates a nutrient-rich environment ideal for zucchini growth, which would not naturally occur in many temperate soils.
- **Mulching:** Mulch is applied to conserve soil moisture, suppress weeds, and protect the developing fruit from direct soil contact, reducing disease risk.

Water Management

- **Irrigation Systems:** Regular and controlled watering is essential, as zucchinis require consistent soil moisture. In temperate regions, drip irrigation is used to supplement natural rainfall, especially during dry spells. This intervention ensures reliable yields even in periods of inconsistent rainfall.

Microclimate Modification

- **Planting Time Adjustment:** Zucchinis are sown in spring to early summer (September–January in temperate climates), after the risk of frost has passed and the soil has warmed to at least 15°C. This timing is carefully chosen to match the plant's needs with the local climate.
- **Shelter and Protection:** In exposed areas, windbreaks or sheltered planting positions are selected to protect large zucchini leaves from wind damage. In cooler parts of the temperate zone, seedlings may be started undercover or in seed trays to avoid late frosts.



Pest and Disease Control

- **Integrated Pest Management:** Human intervention includes the use of physical barriers (like netting), organic sprays to deter pests and attract beneficial insects.
- **Disease Prevention:** Careful watering at the base of plants, rather than overhead, helps prevent fungal diseases such as powdery mildew.

Varietal Selection and Breeding

- **Cultivar Choice:** Growers select modern zucchini varieties bred for high yield, disease resistance, and suitability to temperate Australian conditions. For example, the 'Blackjack' variety is popular for its productivity and adaptability.

Outcomes and Impacts

These human interventions have transformed the temperate biome, making it highly productive for zucchini cultivation. The result is a reliable supply of zucchinis throughout the warmer months, supporting commercial agriculture. However, these modifications also require ongoing management of soil health, water resources, and pest populations to sustain productivity and minimise environmental impact.

Zucchini production in Australia's temperate biomes is a clear example of how humans alter natural environments to meet agricultural needs. Through soil enrichment, irrigation, microclimate management, pest control, and selective breeding, growers have adapted the landscape to support a crop that would otherwise face limitations in the region's natural conditions. These practices highlight both the potential and the responsibility of human intervention in sustainable food production.



LAND MANAGEMENT

Land management strategies in temperate biomes have evolved to support both agricultural productivity and ecological balance. Techniques such as crop rotation, mulching, and selective land clearing are widely used to maintain soil moisture, prevent erosion, and encourage biodiversity. These regenerative practices, combined with the temperate climate's extended growing season, allow farmers to harvest zucchinis even when colder regions face seasonal limitations. As a result, temperate biomes serve as strong examples of how thoughtful human interventions—focused on efficient resource use, soil health, and sustainable farming—can create thriving agricultural landscapes that benefit both people and the environment.

In addition to these traditional strategies, innovative approaches like greenhouse and polyhouse production are increasingly being adopted in temperate regions to further enhance both productivity and sustainability. These technology-driven systems not only boost yields and improve crop quality but also significantly increase resource efficiency, particularly regarding water and nutrient use—a crucial advantage in areas where rainfall can be variable and water conservation is important.