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Hawkesbury Institute
for the Environment

RESEARCH CAPABILITY

Plant Adaptive Capacities

Ensuring sustainable natural and urban landscapes across Australia

Acknowledgement

Western Sydney University acknowledges the peoples of the Darug, Tharawal, Eora and Wiradjuri nations. We acknowledge that the teaching, learning and research undertaken across our campuses continues the teaching, learning and research that has occurred on these lands for tens of thousands of years.

Researchers

To contact HIE Plants, Animals and Interactions Theme scientists, please go to:
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Published by

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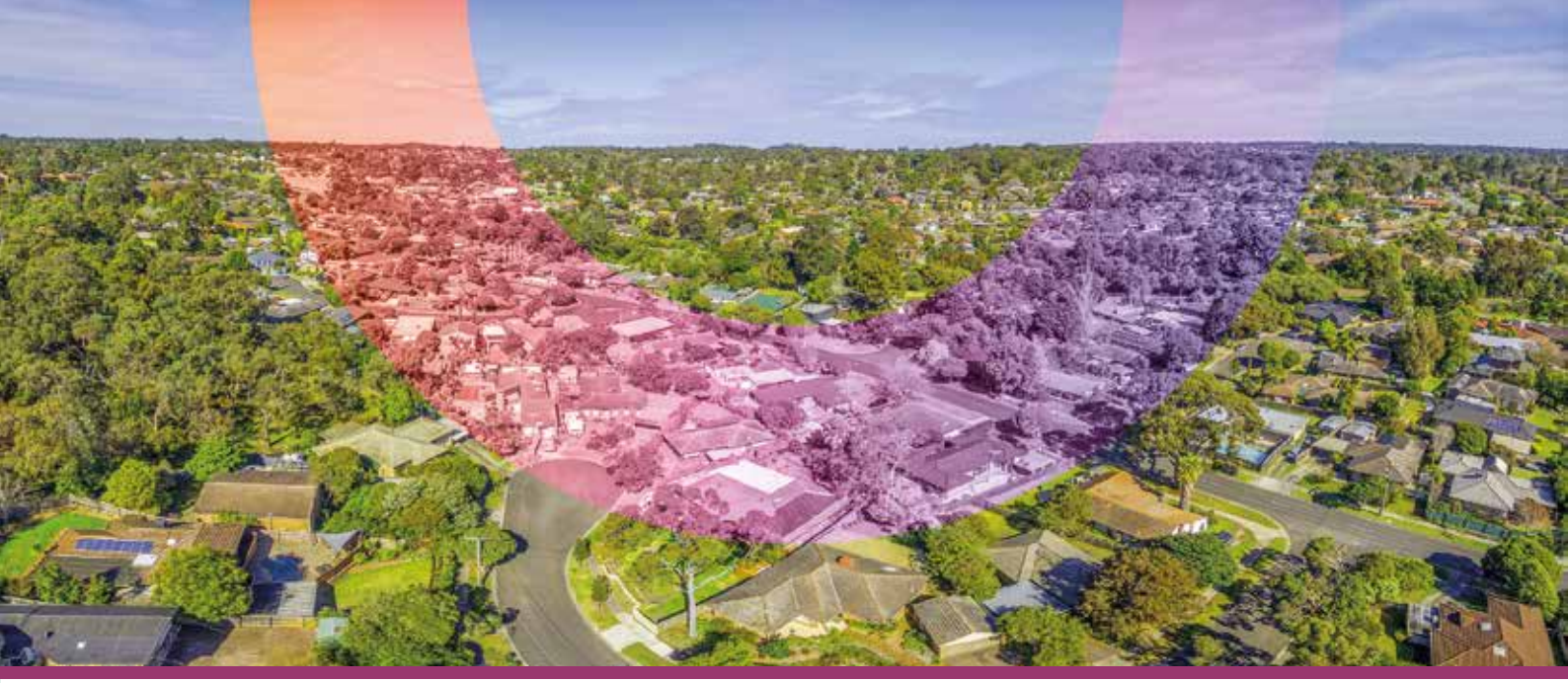
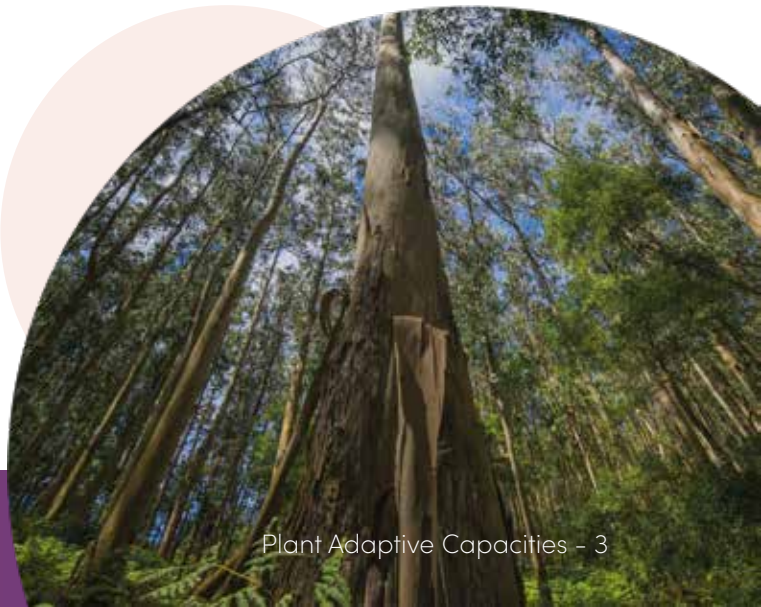


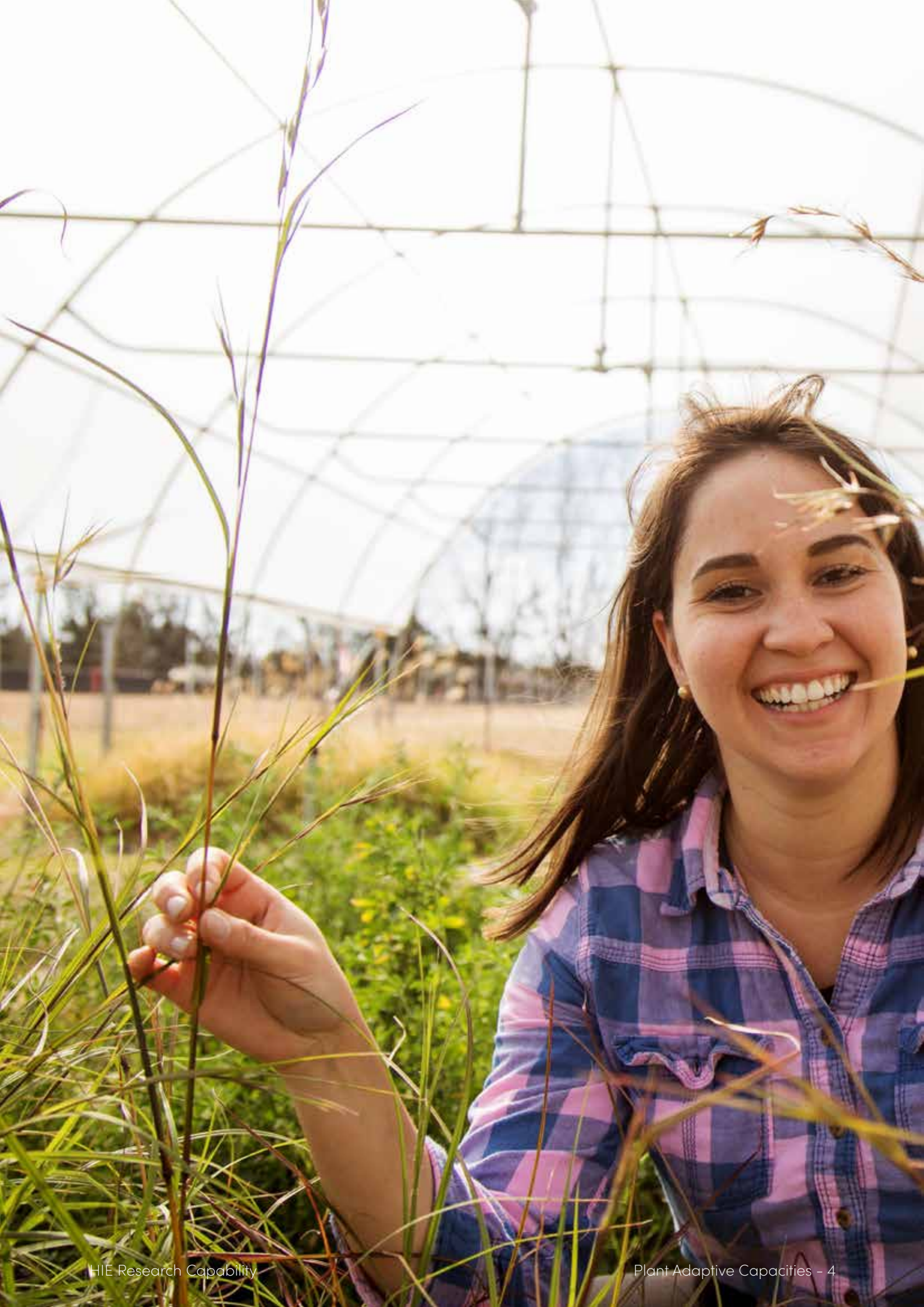
Ensuring sustainable natural and urban landscapes across Australia

Plant responses to environmental change and the characteristics that allow them to endure stressful conditions can determine their function, productivity and longevity in an ecosystem.

Understanding how plants adjust in the short term and adapt in the long term to new conditions, and the physiological and genetic mechanisms involved, is crucial to predict shifts in plant populations and managing plants in both natural and urban landscapes.

With climate change stressors such as drought and heat waves intensifying the pressure on plants worldwide, researchers at the Hawkesbury Institute for the Environment have the expertise to meet the need for science-based management strategies and policy development that are essential to ensure sustainable ecosystems into the future.





Plant responses

Our research focuses on the characteristics and mechanisms that allow plant species, populations and communities to acclimate and adapt to new environmental conditions using controlled environment experiments as well as natural gradients to simulate climate change stressors in both urban and natural landscapes.

1. Environmental Change

Altered temperatures, rainfall regimes, drought, atmospheric carbon dioxide (CO_2) concentrations.

2. Acclimation

The process of adjustment by an individual organism according to its environment. Changes may be sudden due to changed climatic conditions. It allows the organism to maintain performance under different environmental conditions.

3. Adaptation

A dynamic evolutionary process that helps the organism adjust to their environment by enhancing their evolutionary fitness. Changes occur in a population or species creating novel phenotypic traits through natural selection.

Urban landscapes

Several nationwide initiatives are aiming to make Australian cities greener and more sustainable. Improvement of air quality, cooling effect, mitigation of storm water, and recreational and wellbeing benefits are just some of the key services green areas provide to make our cities more liveable.

Natural and managed ecosystems

Plant populations and communities in natural and managed productive ecosystems will cope differently as a result of future environmental change.

Understanding how these shifts will impact the distribution, phenology, and dynamics of native species and crops is key to formulating management policies to safeguard their resilience into the future.

Our researchers are interested in how well species perform when exposed to warmer, drier conditions, and understanding the characteristics that influence species' climate sensitivity.

Research directions

Trees are a key component of sustainable urban design, contributing substantial benefits to growing cities, including improved air quality, carbon sequestration, cooling, stormwater mitigation, increased biodiversity and property value; they are essential for making our cities liveable.

The supply of quality tree stock is crucial for sustainable urban landscapes and to achieve greener cities.

RESEARCH DIRECTIONS

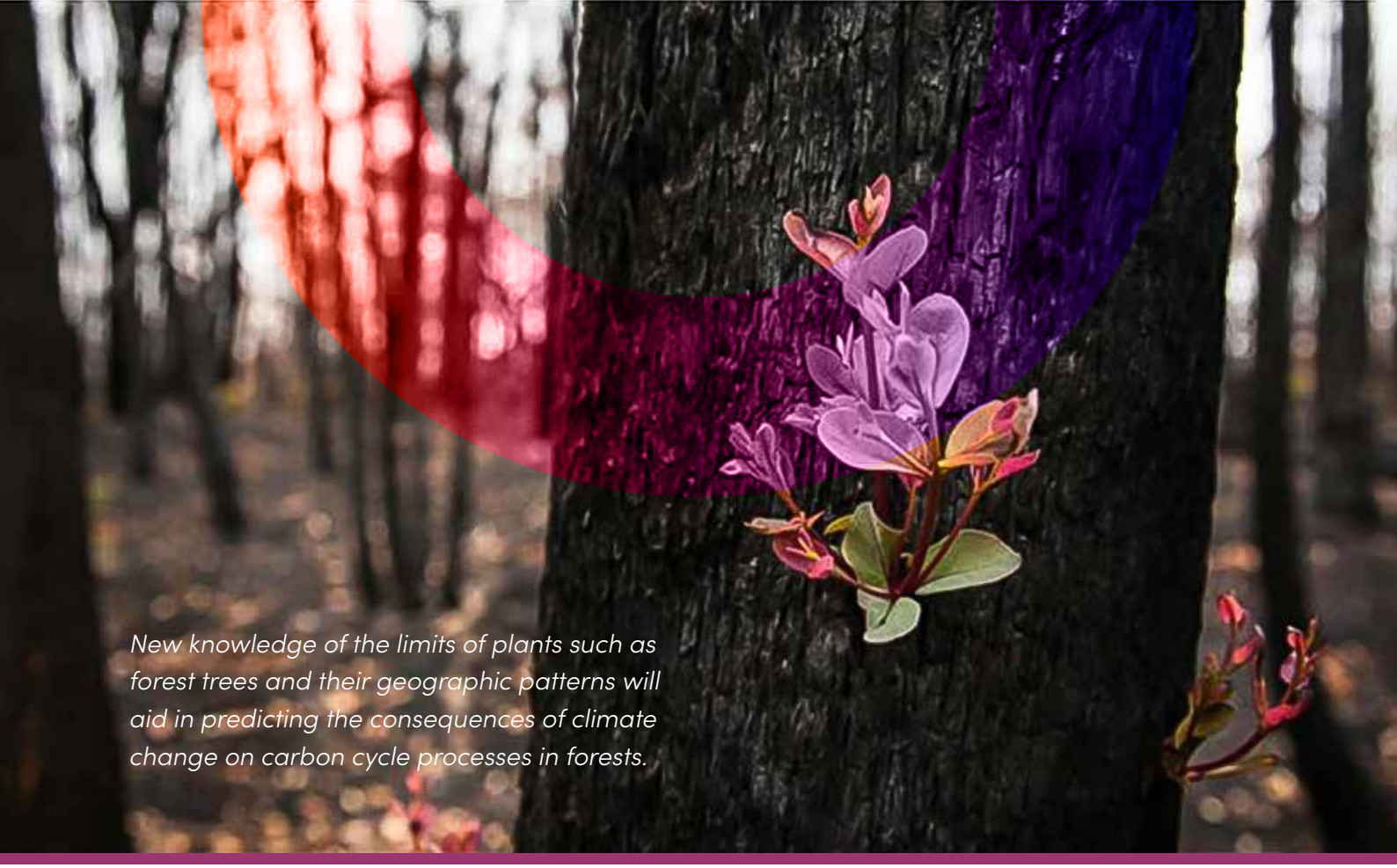
A better way to assess the quality of Australian trees

A new Australian Standard known as AS2303:2018 is based on new metrics and criteria developed by researchers at the Institute to better assess the quality of Australian tree stock deemed ready for sale. The new criteria better reflects the variability of Australian tree stock and the climate regions and species available, and overcomes the limitations of the previous standard AS2303:2015.

RESEARCH DIRECTIONS

Which plant where, when, and why?

Building a robust database to help select the right plant, for the right spot, and in the right moment for both current and future climate conditions in urban areas, the Institute's researchers have helped urban designers by guiding their landscape plantings to ensure endurance over time, despite more extreme environmental conditions.



New knowledge of the limits of plants such as forest trees and their geographic patterns will aid in predicting the consequences of climate change on carbon cycle processes in forests.

RESEARCH DIRECTIONS

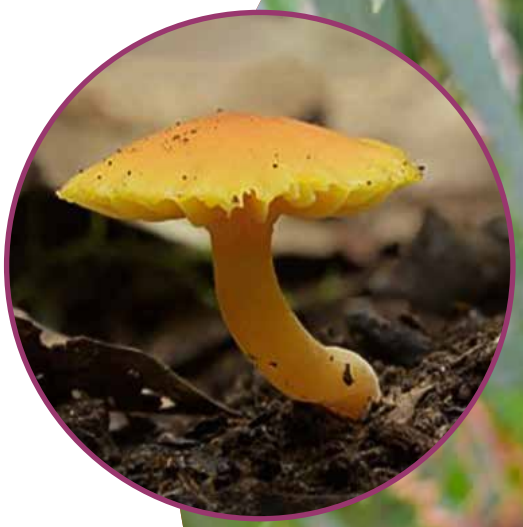
Can forests adjust to new climate conditions?

The capacity of trees to adjust to warmer climate conditions will determine the resilience of Australian forests in the future. To allow us to predict the affects of climate change, our researchers are studying the physiological changes in trees in a range of forest types in Australia, from rainforests to temperate forests and woodlands.

RESEARCH DIRECTIONS

Drought tolerance

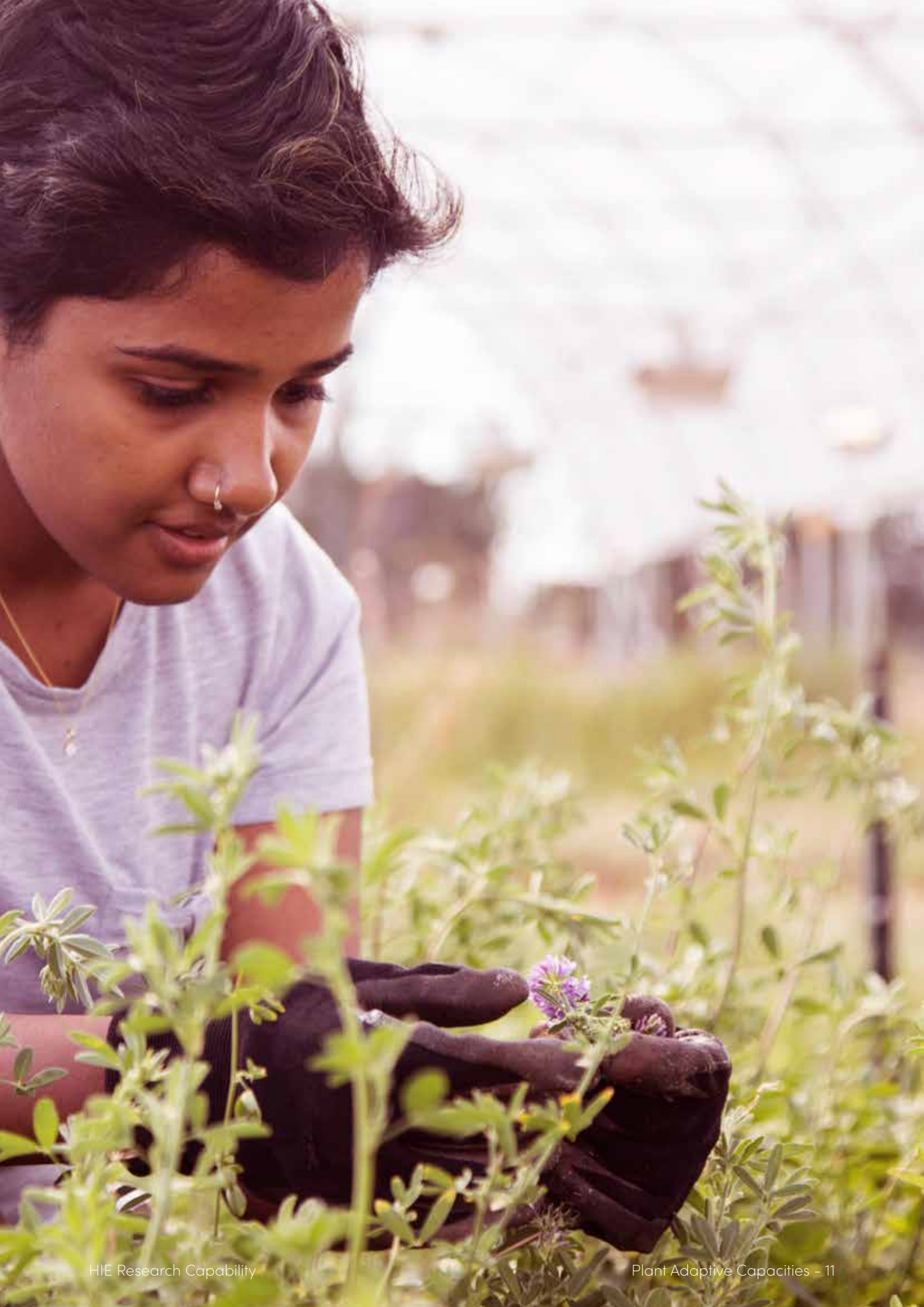
Studying the genetic variation, adaptive capacities, physiological flexibility, and thresholds that allow Australian native and crop species to tolerate drought, heatwaves, and tree mortality events, our researchers have progressed our understanding of how climate change stressors will affect the productivity and sustainability of forest, crop, pasture, and grassland systems.



RESEARCH DIRECTIONS

The value of citizen science

Involving the community in scientific research provides Institute researchers with a unique opportunity to upscale research, fill crucial data gaps, deliver tailored outcomes, turn data into information and knowledge, and drive behavioural change.



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We invite researchers and investors to explore future opportunities to work with the **Hawkesbury Institute for the Environment.**

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