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To the teacher...

The purpose of this book

This book is part of a series of five designed to convey a holistic understanding of ecological principles and contemporary environmental problems. Such a holistic understanding can provide us with the tools for solving environmental problems — on both a local and global level — thus allowing us to move toward a healthier future.

Conveying a holistic understanding of the world

The theme for all five books of this series is provided by a simple notion: environmental problems — such as pollution, resource depletion, extinction of organisms, and overpopulation — exist because the human world does not model the conditions that generate **balance** (equilibrium or stability) in nature. If this notion is valid, it follows that environmental problems may be solved, or avoided, if the human world were to model those conditions.

Two questions arise from these statements: (1) What are the conditions for balance in nature? and (2) What characteristics of the modern human world differ from, or oppose, those conditions? Answers to these questions must deal with the following characteristics or principles governing the biosphere, *including* its human element:

1. Everything — living and nonliving — is in a constant state of change.
2. There is a constant exchange of materials between living things, and between living things and the physical environment.
3. Matter and energy cannot be created or destroyed, but may be transformed; as energy is used, it is ultimately transformed into heat, which largely dissipates into the atmosphere.
4. Populations of organisms tend to grow exponentially — that is, by doubling — a pattern characterized by staggering leaps in numbers following a gradual initial buildup.
5. Living things are interdependent with one another and with the physical environment.
6. Living things are the product of their heredity and environment.

Whether or not these six characteristics result in a state of balance is conditional. For example, if change is *gradual*, *minor*, or *occurring periodically* (such as seasonal change), an ecosystem can absorb the change, or become part of a gradual, nondisruptive turnover of species and surroundings — as in natural succession. In such cases, a state of dynamic equilibrium — or balance — may exist at any point in time. If change is *abrupt and drastic*, on the other hand, as in the eruption of a volcano or the excavation of a pit mine, balance may not exist (at least in the region surrounding the event, although it may be maintained on a larger scale).

Nature tends to maintain itself in a state of balance because of six conditions which are generally true of the characteristics outlined above. These conditions are presented schematically on the following page.

In contrast, the human world is characterized by:

1. **abrupt and drastic changes** — as in mining activity, excavation for homesites, deforestation, etc.
2. **cycles which are open in terms of human (as opposed to geologic) time spans** — as when raw materials are "locked up" in landfills rather than recycled.
3. **use of short-term (i.e. non-renewable) energy resources** — as illustrated by a continuing dependence on fossil fuels.
4. **unchecked growth of the human population.**

These departures from the first four conditions for balance have resulted in disruption of nature and a deterioration of environmental health that further affects nature as well as ourselves. The remaining two conditions fostering balance in nature are modelled in some significant ways within the human world, but not in ways related to our treatment of the natural world around us:

5. **Webs of interdependence are simplified** — through monoculture farming, clear-felling of forests, etc.

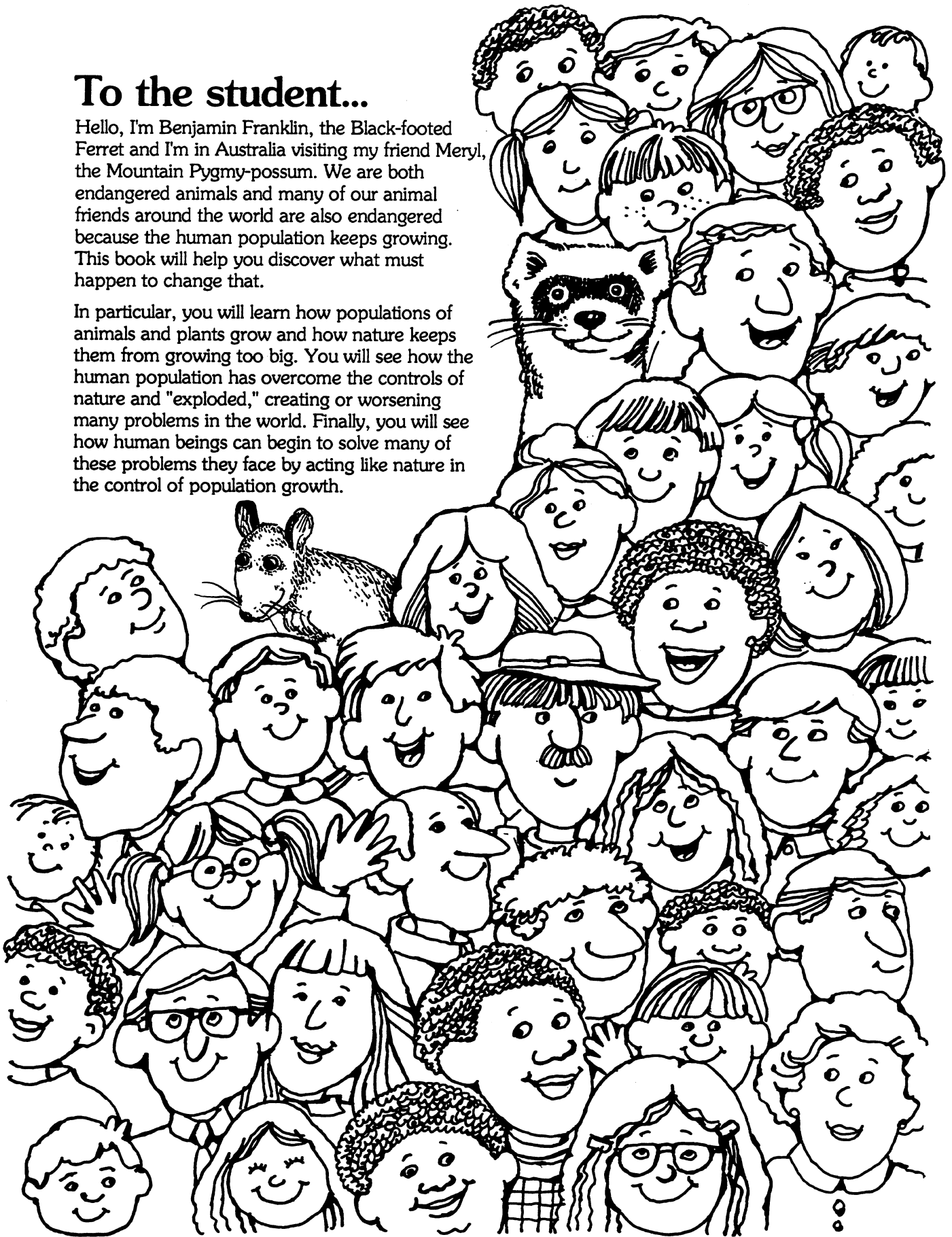
6. **Adaptation of organisms to their environment is frequently destroyed** through alteration of their natural habitat or through alteration of their physiology by radiation or chemicals in the environment.

Modelling the conditions that generate balance in nature may alleviate environmental deterioration and promote harmony between the modern human world and the world of nature. The means to this end are feasible and do not require a discarding of technology. For example, organic wastes could be recycled as fertilizer, renewable energy resources could be put into large-scale use, the number of children born to a family could be voluntarily limited, and agricultural systems could be diversified. This concept of modelling the conditions for balance in nature appears in all five books of this series as the foundation for a holistic understanding of the world and its environmental problems.

To the student...

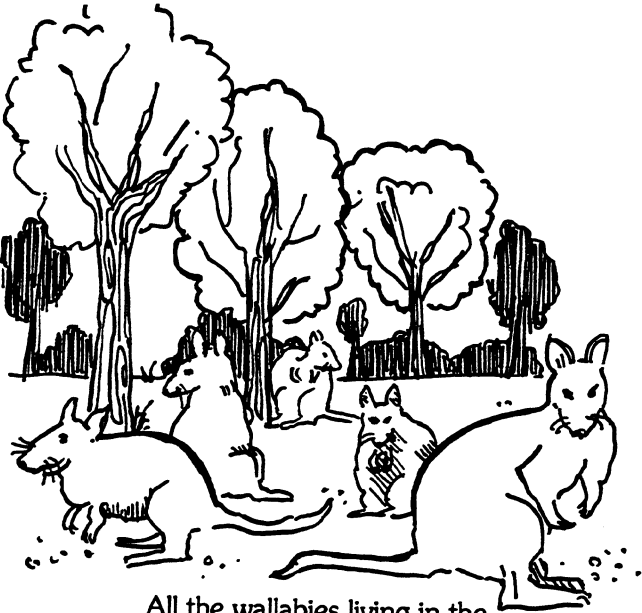
Hello, I'm Benjamin Franklin, the Black-footed Ferret and I'm in Australia visiting my friend Meryl, the Mountain Pygmy-possum. We are both endangered animals and many of our animal friends around the world are also endangered because the human population keeps growing. This book will help you discover what must happen to change that.

In particular, you will learn how populations of animals and plants grow and how nature keeps them from growing too big. You will see how the human population has overcome the controls of nature and "exploded," creating or worsening many problems in the world. Finally, you will see how human beings can begin to solve many of these problems they face by acting like nature in the control of population growth.



What Is a Population?

1. **Population** is a word you hear a lot. Just what is it? Three populations are shown below. Based on these pictures, can you give a definition for the word *population*?



All the wallabies living in the forests of Victoria today.

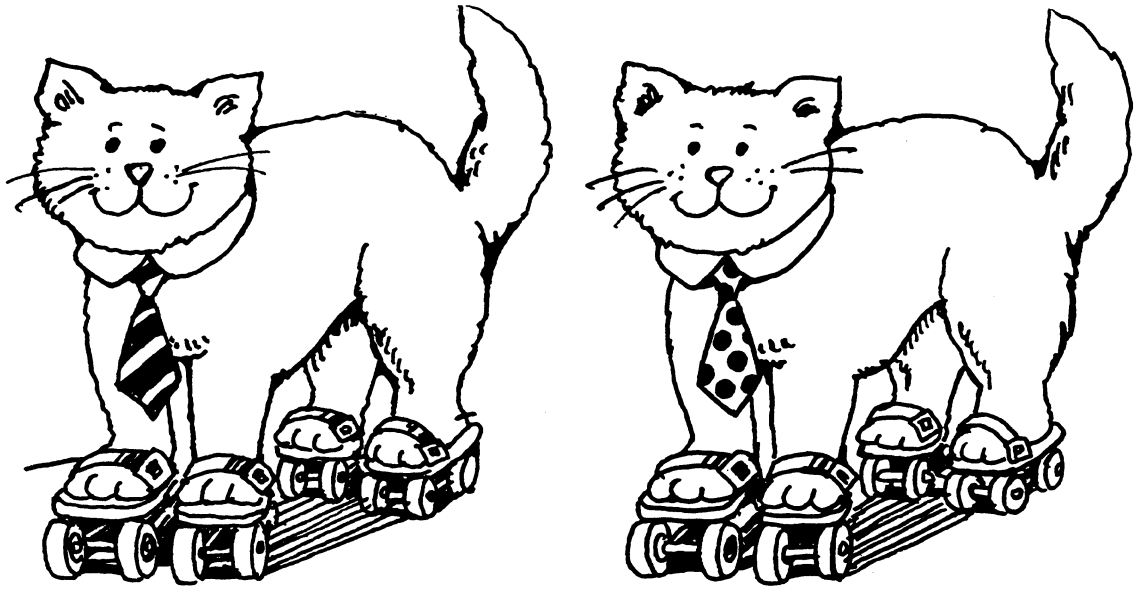


All the rabbits wearing spectacles to read the offers on their cereal boxes this morning.



All the people watching the stars from rooftops in your community at midnight tonight.

A population is _____



Actually a population is **the total number of a certain thing in a certain place at a certain time!**
 Make up a few silly populations of your own!

a. (who or what) _____
 (where) _____
 (when) _____

b. (who or what) _____
 (where) _____
 (when) _____

c. (who or what) _____
 (where) _____
 (when) _____

Now go out in your school yard and find a real example of a population. Look up, down, and all around.

What population did you find? _____

2. There are many populations within your school and classroom right now. How many members are there in each of the populations below?

- Brown-eyed people _____
- People who took a shower this morning _____
- Plants _____
- People who smile when you say hello _____
- People wearing runners _____
- Bathrooms in the school _____
- People with glasses _____
- Pencils with rubbers _____
- Telephones in the school _____