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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 over-population — 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:

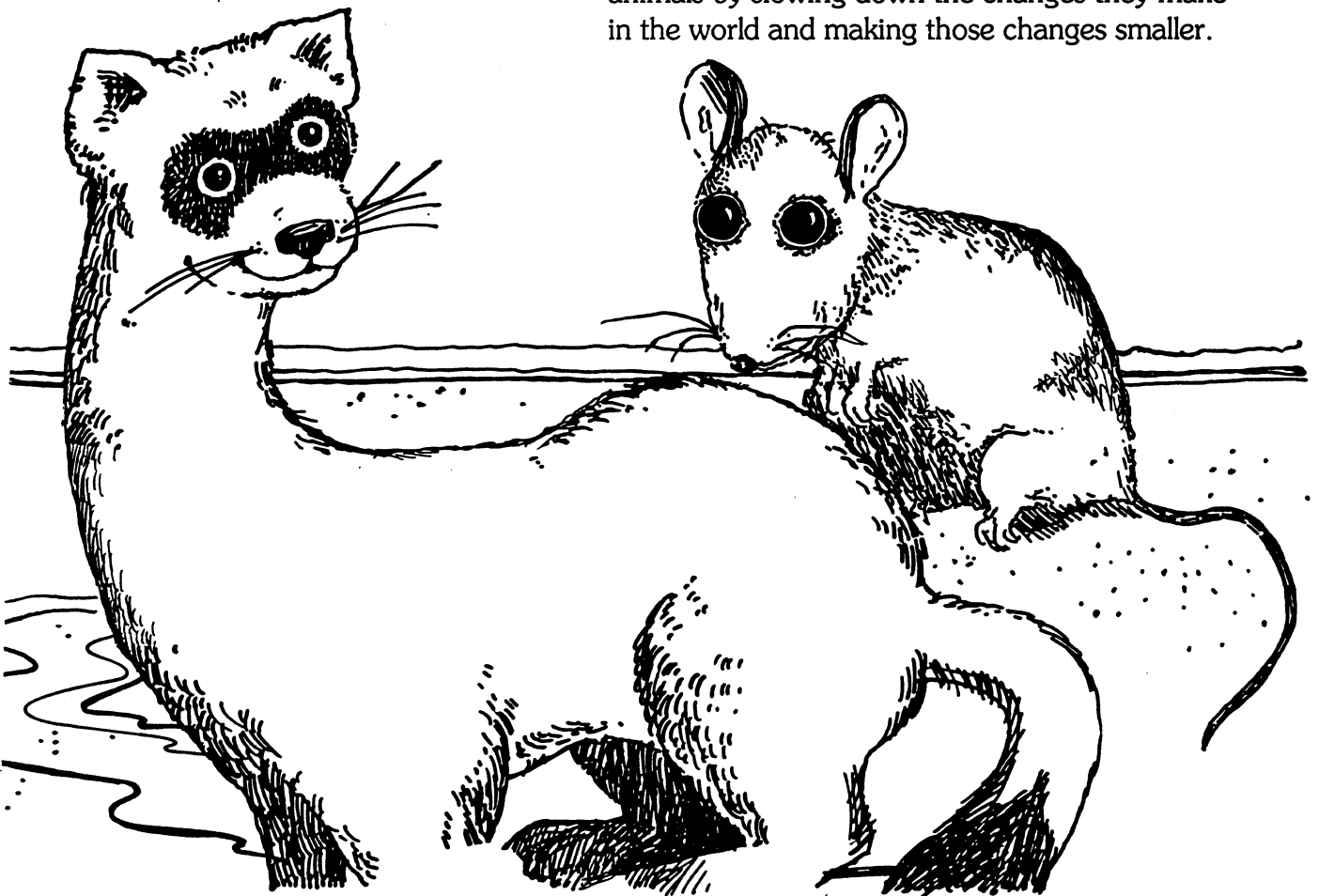
5. **Webs of interdependence are simplified** — through monoculture farming, clear-felling of forests, etc.
6. **Adaptation of organisms to their environment is frequently destroyed** through alteration of their natural habitat or through alteration of their physiology by radiation or chemicals in the 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 from America. I am an endangered animal and I am in Australia visiting my good friend Meryl, the Mountain Pygmy-possum, who is also an endangered animal. There are only a few animals like us left in the world. So of course I would like everyone to help keep the environment healthy and to allow all living things room to live. In this book, I will help you discover some ways that you can do this.

In particular, you will learn how we animals are all especially suited to the places in which we live. If those places are changed abruptly or drastically, we may no longer be suited for living there. This is what has happened to my family and to many of my cousin animals throughout the world as people have changed the earth. In this book, you will see how you can help save some of those animals; and you will see how humans can stop being a threat to plants and animals by slowing down the changes they make in the world and making those changes smaller.



Suiting Up for Survival

1. Invite a pet from your home, or the home of a classmate, to come to your classroom for a day. Observe the animal's appearance and actions carefully.

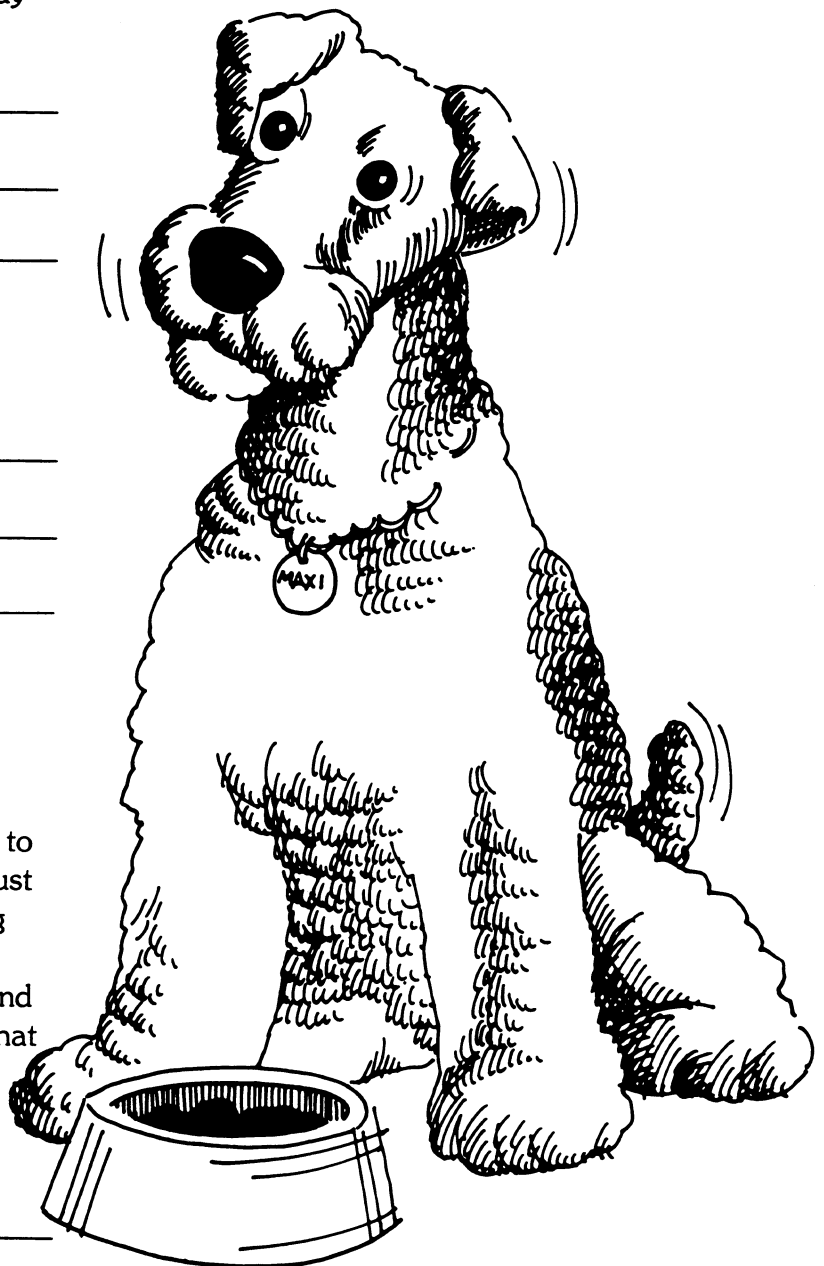
What are some features of this animal's body that help it to survive?

What are some features of this animal's behavior that help it to survive?

You have just listed many of this animal's **ADAPTATIONS**.

An adaptation is any feature of an **organism's** body or behavior that helps it to survive. In order to survive, an organism must be able to meet its life needs, such as eating and breathing. It must also be suited to the conditions around it, such as temperature and moisture. So an organism has adaptations that help it do all that.

Is your class visitor well-suited for survival?



Suited for Special Conditions

2. Some adaptations suit an animal or plant for the conditions around them, such as the temperature, the amount of water, the amount of sunlight, and the type of soil. Organisms suited for certain conditions may look or act very different from organisms suited for different conditions. Often you can tell all about an organism's home just by looking at its body and behavior.

Which animal on the right do you think lives in an environment where the temperature is very low most of the time?

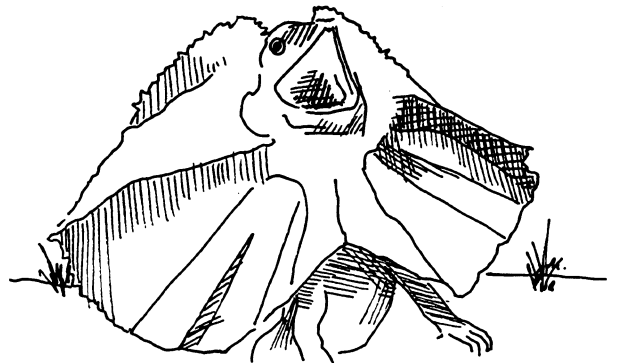
Why? _____

Which animal lives where the temperature is high most of the time?

Why? _____

Which animal might live where the temperature is neither very hot nor very cold most of the time?

Why? _____



3. Examine the bark of trees around your school or home. How does bark help to protect a tree?

Trees can be identified by their bark. Sketch the bark of a tree you examined and label it.

