

Learn the Basics, Save the World

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Not many people affect world history like Homer Swingle. The former insect biologist turned fish biologist at Auburn University developed basic principles of fish pond management that we still use today. A deep knowledge of these fundamental principles allowed Swingle and his colleagues to help societies across the globe that were growing fish for food and recreation. This rural fish biologist became so famous that many governments sought him out for his knowledge of fish (i.e., food) production. A well known picture shows him sitting at a table with President Lyndon Johnson and other biologists discussing food production in poor countries.

What were some of Swingle and his colleagues' simple principles? That there is a specific weight (carrying capacity) of fish that a pond can support based on its fertility. That total weight of fish species can be distributed into a few large fish (each individual uses a lot of resources), or many small ones (each individual uses fewer resources). That the total weight of fish can be increased with the addition of nutrients, but only up to a point, when the waste produced by both live and decaying organisms degrades the water quality to a point where the pond is unlivable.

Biologists exist today who have a knowledge of these fundamentals of pond management as deep as any Pentecostal preacher's familiarity with bible verses. A fish farmer holds his hand under the water and can estimate the carrying capacity of the pond based on algal turbidity. A zooplankton technician holds a jar of pond zooplankton up to the light and can declare the pond filled with lots of small fishes based on the average size of the small crustaceans. A professor sees many tadpoles along a pond's margin and concludes that the largemouth bass population is small and has plenty to eat. Strive to be one of these biologists for your ecosystem of interest. Complex computer models and multivariate statistics are important, but the fundamentals come first. Furthermore, fundamental biological concepts can be shared with others who are not necessarily biologists. The farmer on whose property the pond is on. The neighbors who fish the pond. The county extension agency who gives advice on pond management.

To successfully live in our society, all people—bankers, doctors, mechanics, tailors, etc., etc. —could benefit from a deep knowledge of the fundamental principles that drive ecosystems. Unfortunately, people in our society know much more about how to share a video on their smart phone than the basics of how ecosystems work. Therefore, you, as an environmental professional, are in a great position! You can teach

them (perhaps even using your smart phone)! Fundamental biological concepts translate well across ecosystems. Similar to a pond, our earth has a carrying capacity, or total weight of humans, it can support. This weight can be distributed into many humans that don't use many resources or a few humans that use a lot of resources. The total biomass can be increased by the addition of more nutrients/food (e.g., the Green Revolution of the 20th century). However, adding too many people, or increasing the resource use per individual increases waste, which affects the quality of the environment (e.g., climate change, habitat destruction, plastic pollution).

Too many people certainly *are* a problem. Yet, Western countries, like the United States, have a much higher resource use per individual than poorer countries. Material footprint (Wiedmann et al. 2015) per individual in high-income countries is 13 times that of low-income countries (United Nations 2019). Poorer countries want to become wealthy countries, so naturally, their resource use per individual goes up as they get richer. A large population *plus* large use of natural resources per individual equals a big, big problem. Therefore, we need everyone thinking and working to solve complex dilemmas such as this, not just biologists. Everyone is part of the environment; it is not just an abstract concept some people see when they are hiking or camping. The first step to get people tuned in to these complex problems is to talk with them. Make sure they know the fundamentals of how an ecosystem works and how it relates to them in their everyday life. So, if you have a beer, cup of coffee, or a meal with your friends this weekend, don't just talk about what was on *The Bachelor* (or *Bachelorette*) last night! Find a creative way to sneak in something like “carrying capacity” into the conversation. You can be proud of yourself for teaching others the fundamentals, and you will be a creative steward of the planet if you do!

The opinions and tips given here, like all my columns, are mine and do not necessarily represent AFS or my employer.

REFERENCES

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