



Case Study: Budworms

The spruce budworm is a pest that kills spruce and fir trees. In the 1950s, the lumber industry began to use insecticides each year to control spruce budworm attacks. Inevitably, the budworm would resurge the next year, but these sprays bought the industry time for the trees to grow until they were ready to be harvested.

Unfortunately, the cost of annual spraying increased: in 1980, New Brunswick spent \$12.5m on budworm “control”—and the budworm still killed 20 million hectares of trees.

Systems thinkers C.S. Holling and Gordon Baskerville examined the problem. After 2-3 warm, dry spring seasons, budworms would resurge. After these massive resurgences, the worms would kill off most fir trees—and then the budworm population would crash. Left unimpeded, this resurgence-crash cycle would repeat over decades, but the overall ecosystem was sustained.

The insecticide sprays, however, push this cycle out of balance. Insecticide was killing off both budworms and their predators. As a result, fir trees grow plentifully, but because there is so much fir, the spruce budworm is always on the verge of a massive resurgence—and without natural predators to keep them in check. Holling and Baskerville called this “persistent semi-outbreak conditions”—and they noted that the areas of these conditions were growing over time. As a result, the industry was locked in to the insecticide policy: to stop would be to invite an outbreak of unprecedented scale.

(Based on an excerpt of Meadows’ *Thinking in Systems*, 1997.)

Key takeaway: Good intentions aren’t good enough. In fact, poorly placed interventions can make matters worse. We must try to understand the whole system at all possible scales—including delayed effects—before we make change.