ELSEVIER

Ecological Economics 15 (1995) 97–99

ECOLOGICAL ECONOMICS

Forum

Economic growth: politically necessary but *not* environmentally friendly

Robert U. Ayres

INSEAD, Fontainebleau, France

Keywords: Economic growth; Trade barriers; Biosphere, survivability

The opportunity to comment on "Economic Growth, Carrying Capacity, and the Environment" (Arrow et al., 1995) is irresistible. The more so, since I am well aware that any committee document tends to avoid saying anything that any single member of it objects to. As an individual, I feel free to say what I think (in an ideal world) the authors *should* have said.

First, they should have said clearly that the *general proposition* that economic growth is good for the environment is false and pernicious nonsense. In the first place, as the authors noted, the inverted "U" relationship is an observed regularity that is taken seriously by economists because it has an interpretation that fits economic theory, viz. that as people get richer, they will value the environment more and protect it better. This is probably true, for instance, if one compares the attitudes of Northern Europeans with Southern Europeans, or upper middle-class Americans vis-à-vis lower middle-class Americans. However (as the authors correctly noted), the regularity only holds for a relatively small subset of environmental problems—mainly things like local smoke pollution, SO_2, and contaminated water. (The authors should have noted, incidentally, that the argument in the second part of the paper, concerning carrying capacity and ecosystem resilience, applies to a class of environmental problems to which the inverted "U" relationship does *not* hold.) The above interpretation is weak for several reasons cited by Arrow et al., especially the fact that the movement of polluting heavy industry away from the industrialized countries surely accounts for much of the observed pattern.

But, most of all, the proposition that economic growth favors the environment must be rejected for a very straightforward reason that was strangely overlooked by Arrow et al. The argument in question is equally, if not better, supported by empirical evidence. I refer to two well-known relationships: (1) economic growth is historically correlated closely with increased energy consumption (not to mention increased consumption of other resources) and (2) most of the environmental problems of regional and global concern are directly traceable to the unsustainable use of fossil fuels and/or other materials, such as toxic heavy metals and chlorinated chemicals. The basic physical law of conservation of mass implies that every material extracted from the environment is a potential waste (Ayres and Kneese, 1969). Except for materials used in construction, raw materials (and fuels) usually become actual wastes or pollutants within months or a few years at most.

Many environmentalist and some "ecological" economists have argued, from these two points (especially no. 1), that "sustainable development" is

SSDI 0921-8009(95)00073-9

an oxymoron. I have disagreed with this conclusion in the past based on the proposition that economic welfare is based on *services*, not goods, and that in principle the service-content of goods could be increased more or less without limit (Ayres and Kneese, 1989). This is equivalent to saying that the productivity of material resources could, *in principle* be increased enormously—just as labor productivity increased dramatically in the past ("Factor Ten Club", 1994; von Weizsäcker et al., 1995). In other words, *in principle*, economic growth need not be antithetical to environmental protection. I return to this topic later in connection with my comment on the third part of Arrow et al. on policy.

As regards the second part of Arrow et al., again I think the authors should have made their points stronger. First, they should have noted that resilience is relative. A system may be resilient in response to small perturbations and non-resilient in response to larger ones. The authors correctly noted that in a non-linear complex dynamic system (such as the biosphere), there may be multiple equilibria. This opens the possibility that, if sufficiently perturbed, the system might "flip" from one equilibrium trajectory to another. And, they remark that such a flip "could be associated with a sudden loss of biological productivity, and so a reduced capacity to support human life." The authors then go on to speak of the importance of devising environmental policies "to ensure that resilience is maintained, even though the limits on the nature and scale of economic activities thus required are necessarily uncertain."

I think this conclusion is far too mild. In the first place, it leaves a false impression that there is always an "equilibrium state" to fall back on, even if it might be less productive than the present one. This is technically wrong for two reasons. First, from the thermodynamic point of view, the earth (hence the biosphere) is not in equilibrium at all. It is what Ilya Prigogine calls a dissipative system, in a stable state, exhibiting "self-organization" (e.g., Nicolis and Prigogine, 1977). Second, complex non-linear dynamic systems—and the biosphere is one—can theoretically become chaotic. This possibility is not to be dismissed easily. What it means is that we need to ascertain, insofar as theoretically possible, how broad the range of system "resilience" really is.

The third part of Arrow et al. discusses policy implications. The authors' major conclusion is that a policy to encourage economic growth is not a substitute for environmental policy. To the extent that the World Bank and the U.S. government seem to be leaning in that direction, I suppose this is a useful comment. In fact, it is a woefully weak statement, given the fact that current economic and environmental trends, supported and encouraged by current tax and trade policies, are pushing the world in the wrong direction. Increasing labor productivity as a response to perceived needs for increasing *competitiveness* means increasing capital intensiveness, materials intensiveness and energy intensiveness. Increasing resource productivity, on the contrary, would mean literally reversing all of the above trends. This will require something very like a revolution in trade policy, technology policy, industrial policy, labor policy, fiscal policy and tax policy.

As indicated earlier, I do think that continued growth in value added by services (i.e., resource productivity) is technically possible. But it is surely not inevitable. The "invisible hand" does not have a "green thumb," at least under present laws and institutions. Far from it. In the area where economic growth is most rapid (Asia) the anti-environmental trends are accelerating. Apart from building water and sewage treatment facilities (which are lagging far behind needs) there isn't the slightest evidence of environmental improvement associated with increased prosperity.

I happen to agree with those who think that a shrewd mixture of tax policy and traditional environmental regulation would yield the double dividend of reducing materials and energy consumption—hence wastes and pollution—on the one hand, while reducing labor costs (relative to other factors of production) and thus encouraging more labor-intensive employment—more jobs. It would mean shifting the tax base away from labor or value added and onto exhaustible resource extraction or (in some cases) directly onto pollutant emissions. Such a shift would be revolutionary, and certainly hard to sell in the present political climate, even if the key principles of gradualness and revenue neutrality were emphasized. But that is a digression.

As far as trade is concerned, most economists favor it on the grounds that it is supposed to be an engine of economic growth. I refrain from comment

on the validity of this assumption, except to say that I think it is false. But, whatever the relation between trade and growth, one can say unequivocally that two of the key first-order effects of reducing barriers to trade are also antithetical to the environment, viz. (1) increasing goods traffic and (2) continued exploitation of primary extractive activities in remote areas at the expense of secondary and recycling activities in the importing countries that might otherwise compete with them.

As regards the first point, it is hard to believe (but true) that heavily subsidized German potatoes are currently shipped across the Alps to Italy for washing, and then shipped back to Germany for frying! And subsidized Dutch pigs, fed on cassava, tapioca and other feeds imported from Thailand are also shipped in trucks across the Alps to be slaughtered and processed into "Parma" ham. The biggest fishing port on the Adriatic coast of Italy is now totally dependent on imported fish brought by refrigerator ship from the South Pacific. Meanwhile, Austrian attempts to restrict heavy truck traffic across the Brenner Pass—the only one capable of carrying such traffic—because of local noise and pollution problems have been strongly opposed by the EEC (egged on by the Germans) as "restraint of trade."

As regards the second effect, one consequence of reducing trade barriers is that it is getting easier for rich countries to export their industrial (and other) wastes. This is a rapidly growing business, despite international agreements restricting it, and the "green" Europeans are the biggest exporters—mostly to Eastern Europe and Africa. Not only does this undermine local recycling industries in the recipient countries (just as subsidized food exports undermine local agriculture in the developing world), it reduces incentives to develop such industries in the industrialized countries themselves. Moreover, it reduces incentives to develop and implement cleaner technologies.

I could go on at length about other policy issues raised but not resolved by Arrow et al. But a single final comment must suffice. Speaking for myself, I have serious doubts about the survivability of our self-organized biosphere (call it "Gaia" for convenience) under present conditions. The trouble is that because Gaia is so complex and non-linear it may be inherently impossible for science to discover the limits of Gaian resilience. To be sure, it may be possible to burn all the fossil fuels, protect the coastlines from sea-level rise, convert the Amazon to a market garden, and cultivate wheat in Antarctica. But it may not. If it is impossible to know how far it is safe to perturb the system we live in without triggering a catastrophic collapse, then the only reasonable policy is not to perturb it more than it has been perturbed by natural phenomena in the past.

Unfortunately, there is no indication that the world's policy makers are willing to acknowledge any such limits, or even to think seriously about the problem. On the contrary, there is every indication that human economic activity, supported by perverse trade and "growth" policies, is well on the way to perturbing our natural environment more, and faster, than any known event in planetary history, save perhaps the large asteroid collision that may have killed off the dinosaurs. We humans may well be on the way to our own extinction.

In short, while I agree with most of what the authors did say, I wish they had said quite a lot more. They missed an important (and rare) opportunity to change mindsets in high places.

References

Arrow, K., Bolin, B., Costanza, R., Dasgupta, P., Folke, C., Holling, C.S., Jansson, B.-O., Levin, S., Mäler, K.-G., Perrings, C. and Pimentel, D., 1995. Economic growth, carrying capacity, and the environment. Science, 268: 520–521.

Ayres, R.U. and Kneese, A.V., 1969. Production, consumption and externalities. Am. Econ. Rev., June 1969.

Ayres, R.U. and Kneese. A.V., 1989. Externalities: economics and thermodynamics. In: Archibugi and Nijkamp (Editors), Economy and Ecology: Towards Sustainable Development. Kluwer Academic Publishers, Dordrecht,Netherlands, 1989.

"Factor Ten Club", 1994. Carnoules Declaration.

Nicolis, G. and Prigogine, I., 1977. Self-Organization in Non-Equilibrium Systems. Wiley-Interscience, New York, NY.

von Weizsäcker, E.U., Lovins, A.B. and Lovins, L.H., 1995. Faktor Vier Doppelter Wohlstand-halbierter Naturverbrauch. Droemer Knaur, Munich.