

two years of Phase I. These plans centered upon an array of problems which are of utmost importance from both scientific and human viewpoints, in light of the nature and magnitude of the numerous urgent problems facing the U.S., other industry sophisticated countries, and the less advanced societies of the world.

As you have heard, the contemplated programs will be environmental or ecological and will involve emphasis upon investigations in the field in a variety of contexts and settings.

Again, to elaborate before this subcommittee on the subject of the acute problems, both national and global, involved in intelligent use and conservation of all resources, living as well as inanimate, is rather like bringing coals to Newcastle.

The excellent publication issued by the Subcommittee last year, entitled *Environmental Pollution: A Challenge to Science and Technology* epitomized the general problem:

"Considering the powerful forces for ecological change which are at man's disposal, admitting the impossibility of complete foreknowledge of the consequences of many activities, and granting that a highly technical, over-populated world must continue to take risks with natural resources, an 'early warning system' for unwanted consequences is extremely important."

Also:

"None of our natural resources is in so great a supply that it can any longer be considered inexhaustible or truly consumable * * *. Pollution abatement and resource conservation go hand in hand. The resource conservation problem is essentially worldwide and no one geographical or political area is independent of others."

The report also states:

"There is no need * * * for emotional appeals of naturalists, we freely admit that we have a problem * * *. Making appropriate choices as we proceed will depend on much more knowledge than we now have."

Before this Subcommittee, it is probably superfluous for me to point out that alteration of the environment is itself not a recent development. There are historical roots for our present so-called ecological crisis. The use of fire to drive game created the world's savannah's and grasslands. The Romans deforested and overgrazed the land. The fertile crescent of Mesopotamia is now largely arid, sunbaked, and the soil is permeated with salt. The great cedar forests of Lebanon are gone; only a handful of specimens of these magnificent trees remain, high in the mountains. There has been smoke and smog in London from the burning of soft coal since the last of the 13th century and, for at least 500 years, Parliament has shown intermittent concern about the pollution of the river Thames.

While environmental change is not qualitatively new, today's problems and our concern are new because of the new quantitative aspect of the change—the *scale, variety, and speed of the changes in man's physical and social environment*. Another and most important characteristic of current environmental problems is the unanticipated ways in which changes interact, examples being the simultaneous adoption of the internal combustion engine and the surge to urbanization and untoward effects of advances in our ability to transport large quantities of raw materials as illustrated by the recent Torrey Canyon episode off the coast of Cornwall in England.

It is also characteristic that changes in the environment may proceed slowly until a threshold level is reached, after which the change is no longer confined geographically and becomes a matter of regional or global rather than local concern.

It is predicted that our capability to produce electric power will triple by 1980, reaching 492 billion kilowatts with an output of 2.3 trillion kilowatt hours. Per capita power in the U.S. will double by the year 2000, reaching 20,000 kilowatts per person.

By 1975, it is expected that 105 billion gallons of gasoline will power the 130 million vehicles on our highways.

It is the sheer magnitude of the problems generated by today's technology that makes the acquisition of better understanding a matter of global urgency.

During the past two centuries, most governments of the world have devoted their efforts to the accumulation of material prosperity on an unprecedented scale, all in the hope and belief that social and human adjustments would follow spontaneously as they had throughout history.