
A Palestinian Vision of Environmental Protection and Sustainable Development

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Lasting changes are clearly afoot in the Middle East. The language of cooperation - constructive dialogue - is replacing the rhetoric of conflict; the exchange of insights and skills is replacing the exchange of stones and bullets. The Middle East is emerging from a state of war.

The near 50 years of conflict have devastated economic well-being, severely tarnished quality of life and crushed confidence in the future. Hence the centrality of economic and infrastructural development to the furthering of the current transformation is, quite rightly, being stressed by all parties. Regional development must aim to give opportunities to those who have been denied them for a lifetime.

On top of this, the current emphasis on fostering economic and social renewal in the region is motivated by a concern for political stability. Appropriate development could engender cooperation between hitherto warring parties, and result in the state of war being permanently withdrawn, not merely redeployed.

Enthusiasm for boosting the region's economies, however, can fall prey to rhetorical short-sightedness. The impression is sometimes conveyed that the larger the project in question, the more fantastic its goals and the bigger the capital input it requires, the more we should favor it. That 'Big is Best!' is a prevailing assumption.

Ambitious schemes are not unequivocally good things - but neither, it should be added - are they definitively negative. We should, at the very least, be cautious about proposed regional mega-projects. Do they address real needs? Might they not create more problems than they help to overcome? How thoroughly have we assessed potential environmental impacts? And are there any realistic alternatives?

Sustainable development, a central concept of environmentalism since Rio, offers not simply an empty slogan, but a whole re-working of priorities. Firstly, development should focus on addressing minimal needs rather than on providing luxuries. Secondly, development projects should be modest, favoring small-scale and often home-grown options rather than expensive, and often inappropriate, showpieces. And thirdly, development should take note of potential environmental consequences, and place a heavy stress on coming to terms with the legacies of environmental

mismangement. All of these priorities are of the highest relevance to the future of the Middle East:

1. Needs and priorities. Economic improvement, above all the creation of sustainable employment, is high on the list of everybody's agenda. But so too is improving quality of life: the provision of clean water supplies ample enough to cater for demand; access to secure and adequate housing; clean air; the availability of facilities for waste disposal, so that garbage is not simply dumped in the streets, so that sewage does not flow openly where children play; the right to health and to education. Living environments, especially within refugee camps, are often atrocious. The Palestinian refugees are the real victims of the Arab-Israeli conflict; they deserve to see the dividends of peace. It is not just a matter of people's rights to certain minimum living standards, however. For if development fails to take account of basic needs then the whole vision of regional economic development will be undermined, through political extremism, disenchantment and the consequent scepticism of potential investors.
2. Modesty. Small-scale projects should not be viewed as regressive, or not quite up to the standards expected by a techno-centric age. Sustainable development projects are both progressive and highly pragmatic, adhering to the limits of nature as well as the limits of capital. Before looking at mega-projects we should make every effort to ameliorate the water crisis, especially in the Occupied Palestinian Territories, through increasing supplies locally, improving conservation and reducing demand.
3. The environment. In contrast to perceptions in rich Europe and North America, the environment is seen in the Middle East not as something one enjoys on the weekend, but as the milieu in which people live. Environmental concerns are about real, quality of life issues. The environment was often ignored amid the furore of political strife and turmoil: it would be a grave mistake if it were treated as of peripheral importance during this era of conflict resolution. This is particularly the case given that environment problems - which pay scant heed to political boundaries - could inspire regional cooperation, and could thus help to forge links and bind the futures of the region's peoples.

It is these principles of sustainable development which should be the guiding force behind regional development, and it is these principles which inform the projects proposed here.

A Sustainable Approach to the Region's Water Shortage

That resolving the region's water crisis is an urgent task which would bring gains for all hardly bears repeating. For politicians, it would lessen the chances of conflict; for industrialists and agriculturalists, it would foster stable growth; for every citizen, it would result in guaranteed regular supplies of household water. Today, water management is the most critical environmental issue facing the Middle East.

The severity of the current shortages leads many people to conclude that massive desalination projects and water importation are the only viable options. This is not necessarily true. If appropriate internal supply enhancement projects, in combination with improvements in conservation and changes in demand patterns, were carried out, the Dead Sea-Red Sea Canal would be superfluous. Before any desalination takes place, Jordan, Palestine and Israel should coordinate an integrated water program, in which all supplies are sustainably exploited to their fullest, and in which all consumption is tempered by an awareness of the Middle East's natural aridity. Such a water program would aim to optimize both supply and demand through developing a number of techniques, processes and approaches:

- Cloud seeding, a process by which a safe chemical is introduced into a cloud system, has enormous potential for increasing rainfall. Already in operation in areas of northern Israel and northern Jordan, and of proven effectiveness, cloud seeding should be extended to other areas, most importantly to the West Bank. In the West Bank alone, cloud seeding could increase rainfall by 427 mcmy. In turn, an additional 111 mcmy would percolate into the West Bank's aquifers, making a substantially increased yield available. This water would be obtained relatively cheaply: cloud seeding costs only \$0.02-0.04 per cm (see Annex 1).
- Rooftop harvesting is an important means of collecting rainwater which would otherwise be lost as surface run-off and evaporation. 50,000 households in the West Bank already harvest rainwater for household purposes, implying a total yield of 5 mcmy. In Jordan, meanwhile, 9.2 mcmy were collected in 1990. If rooftop harvesting methods were used comprehensively, Palestinians could harvest an additional 30 mcmy, while it is estimated that in Jordan a similar quantity could be harvested. Rooftop harvesting in Israel is negligible, and has little potential owing to the fact that most Israeli houses have sloping roofs (Isaac et al, 1994b; PRIDE 1992).
- Other harvesting methods include the collection of water from greenhouses and wadis. A great deal of water currently runs off, straight into the Dead Sea. Wadi harvesting involves the construction of small-scale terraces and dams. Greenhouse harvesting, meanwhile, is a method of collecting run-off from agricultural plastic sheeting, and preliminary estimates indicate that 4 mcmy could be yielded by this method in the West Bank and Gaza Strip alone.
- Saline water, which is all too common both in the Jordan Valley and Gaza, is of minimal agricultural potential. Saline water could, however, be mixed with fresh water, resulting in water of high enough quality for irrigation. Clearly, extraction of saline water would have to beware of the danger of exacerbating the quality of groundwater - this is particularly salient in Gaza.
- Comprehensive wastewater treatment would not only cut public health and environmental risks; it would also provide plentiful supplies of water for irrigation. 154 mcmy of treated wastewater are currently being re-used in Jordan, Palestine and Israel. However, 70% of domestic wastewater can be re-used given appropriate technology, and it should therefore be possible to increase annual wastewater re-use by 264 mcm (see Annex 2).
- Improving supply networks must be a priority. Water is often conveyed to irrigated lands through open earth channels; old pipes and inadequate maintenance aggravate the problems of domestic water supply. The water

infrastructure in the West Bank and Gaza are of particular concern: estimates of water loss are as high as 40%.

In addition to increasing supplies, ways of lowering demand should be considered. It should be borne in mind that, as Israel has discovered in recent years, there is no reason why reducing water consumption need have a negative impact on economic growth rates (Berck and Lipow, 1993).

- Irrigation techniques vary incredibly in the efficiency of their water use. While traditional surface methods are only around 45% efficient, drip systems reach efficiency levels of 80%. Given that agriculture is the region's biggest water consumer, and given that so much land is still cultivated using surface methods, irrigation is an area with plenty of room for improvement. For example, Palestinian farmers in Jiftlik have increased the production of vegetables tenfold through the introduction of efficient irrigation techniques, without any significant increase in water used (Rymon and Or, 1989). In addition to being water efficient, the extension of drip irrigation would also be economically positive: for some crops and some areas, capital return times would be under one year (Isaac et al, 1994b).
- Improving crop selection could have a substantial bearing on the amount of water used for agriculture. Efforts to further develop and introduce salt-resistant crop varieties should be hastened, and cultivation of crops which have high water requirements, such as cotton and strawberries, should be reduced.
- Reducing the area under irrigation through encouraging dryland farming is a further means of reducing demand. Rainfed farming has traditionally been considered an unproductive gamble, defenseless against the whims of nature, but this perception could be overturned. Research in Palestine has shown that, if crop varieties and land management are improved, yield increases of up to 290% could be attained. Such yield increases imply that shifting some cultivation away from irrigation would be both water efficient and economically feasible (Isaac et al, 1994b). As this somewhat cursory discussion shows, there is a great deal of scope for optimizing water use in Jordan, Palestine and Israel. The facts that cloud seeding in the West Bank alone could replenish aquifers with an extra 111 mcmy, and that wastewater re-use in Jordan, Palestine and Israel could yield 264 mcmy are very revealing. By way of comparison, the water deficit in Gaza - a deficit that is having disastrous environmental consequences - is merely 37.2 mcmy; and the construction of three further dams on the Jordan and Yarmouk Rivers is hoped to yield 50 mcmy. There is a danger that, in aspiring to regional stability, it will be simply assumed that there is insufficient water available to cater for demand. It should be asked whether feasibility studies will venture beyond the specific parameters of the economic, technical and environmental costs and benefits of the Red Sea-Dead Sea Canal. Before going ahead with such a project, the broader question needs thoroughly addressing, perhaps in the form of an alternative feasibility project: is there sufficient water for present and future generations, and is external water enhancement the best option?

Ensuring water quality

Related to the problem of water shortage is that of water quality. This deserves immediate consideration, particularly in the Gaza Strip, where seawater intrusion and agricultural pollutants are rendering water a severe health hazard.

Dual systems are a potential means of averting this hazard to human health. Less than 10% of all domestic water consumption is for drinking and cooking, and it is for these purposes that high quality water must be available. Technology exists for homes and institutions to be installed with two sources of water, one to be used for drinking and cooking, and the other for all remaining functions. Given the constraints on regional water supply, the projected population increases, the high cost of tanked fresh water delivery and the unsustainability of the current situation, the installation of dual systems in the Gaza Strip is a viable option. And if such a scheme proves successful in Gaza, it could act as a precedent for domestic water supply throughout the Middle East.

Combatting Desertification

The problem of desertification is also in need of addressal. Soil loss and degradation have chronically affected the region for decades, with repercussions on the quality of arable land, and on natural plant and wildlife biodiversity. While the Israeli desert has bloomed, the once-verdant heights of Palestine have been denuded, to the extent that the Israeli-West Bank border is now clearly visible on satellite images. Desertification is an issue that deserves considerable attention.

To the west of the Jordan Rift Valley is an arid to semi-arid zone, commonly referred to as the 'eastern slopes' area, which receives just 100-300 mm of rain per year. This area, which constitutes close to 40% of the West Bank, is a gold mine of biological diversity. Over 2500 plant species are known to exist along these slopes. Many of these are biologically specific to the Fertile Crescent; at least sixteen have been identified as economically important to pastoralists; others are known to have medicinal properties, and are often used by the local population. Gene stocks for future agricultural advances may be hidden among the grasses and legumes that grow naturally in this region. Additionally, the eastern slopes constitute an important crossing point for migratory birds and are home to wildlife native to geographic Palestine.

The area was initially deforested under the Ottoman Empire, and since then it has been practically devoid of trees. The situation has further deteriorated since 1967. 85% of the eastern slopes have been closed off to Palestinians, mostly for military purposes. This has led to severe overgrazing of the remaining 15%, where an estimated 300,000 domesticated animals, mostly sheep and goats, have been roaming land fit for 25,000 to 30,000. The ecological health and biodiversity of the restricted areas remains unknown: best guesses are that the land, although negatively affected by military exercises, remains in considerably better condition than the unrestricted 15%.

A great opportunity now exists to rehabilitate this important area. With a peace agreement signed between Jordan and Israel, the security rationale for the closing most of this 1.5 million dunum tract of land has collapsed. The closure should be lifted to allow scientists to determine the best means of preserving, indeed enhancing, natural vegetation. All this should be done in consultation with local pastoralists, who will know better than scientists the plant life that exists now, and existed in the past. In the long-term, a system should be developed with pastoralists so that they feel they have a stake in the long-term management of the area for reasons of tourism, livestock production and other possible economic benefits (use of medicinal plants, etc).

All this could be done at a relatively modest price. \$200.00 per dunum, equivalent to \$300 million for the whole area, would be sufficient for the initial revitalization of the land. Thereafter, the donor community would be asked to support, at a relatively low cost, the formulation of management systems for the area. The payoffs in terms of sustainable livestock production, preservation of economically and medicinally important plantlife, and preservation of biological diversity would be well worth the financial inputs.

Pesticides and Integrated Pest Management

The Jordan Valley, especially to the north of the Dead Sea is an intensely productive agricultural area. The warm, semi-tropical climate and the access to dependable springs enable the Jordan Valley to be the vegetable garden and the orchard of both Jordan and Palestine.

It is hardly surprising that this intensive production is opening the door to environmental degradation and health hazards. Application of pesticides in the Jordan Valley, many of them highly toxic, is excessive. More worrisome still is the fact that seven of the pesticides regularly used in the West Bank are among the notorious and internationally banned "dirty dozen" (ARIJ, 1994).

All of this should indicate an urgent need to address the problem of pesticide usage. A regional program to develop integrated pest management (IPM) strategies would access farmers to training and resources, and foster the understanding that chemicals are should be used as a last resort. IPM systems emphasize comprehensive ecosystem management, and the minimization of crop damage through the use of cropping rotations and natural predators. Such programs already exist in South East Asia and Africa. Non-governmental and governmental research and extension systems from throughout the region, as well as regional and international institutions, such as the International Center for Agricultural Research in Dry Areas (ICARDA) and the Food and Agriculture Organization (FAO) should be involved in developing this approach. The whole project would cost around \$50 million.

Dealing with waste

Waste management in much of the Middle East is in a sorry state. Illegal dumping sites abound; sewage collection networks are in poor condition; recycling is minimal. Not only does the presence of so much waste tarnish the environment in which people have to live; not only does waste constitute a serious health hazard; not only is waste likely to be an impediment to tourism and investment. Waste, unless properly managed, threatens to pollute ecosystems and damage the natural environment for years to come.

Among many Middle Eastern states, however, the introduction of proper waste management schemes is problematic. Funds are limited, and waste management requires high capital investment, often too high for small populations to sustain. In addition, land for waste disposal is scarce.

Regional waste management could enable these problems to be overcome. Economies of scale could be achieved through Jordanian-Egyptian-Palestinian-Israeli cooperation, and would render high technology management schemes economically feasible. The costs of transporting waste to a single recycling and waste management plant would be minimal compared to the capital and running costs involved in establishing such schemes in each individual country. Local collection points, equipped with sorting and compacting facilities, and acting in coordination with a regional center, could allow the comprehensive recycling of metals, glass, paper, plastics and tyres, as well as the management of bulky wastes, such as cars, and hazardous wastes. On-site collection facilities would allow industries and institutions to take advantage of the waste they generate, saving both capital and natural resources. Public education and awareness raising would be necessary corollaries of such schemes.

Conclusion

The link between political conflict and environmental damage is an unavoidably recurrent theme in the Middle East. Regardless of whether the focus is water supply and conservation, desertification, pesticide use or waste management, the impact of the state of war - and, above all, the impact of occupation - keeps cropping up. The emergent opportunity to rectify this sour relationship between ecology and politics must not be ignored, neither locally, nor by the international community.

All development, regardless of scale, requires considerable financial development. The region's peoples are reliant on international donors and investors taking an interest in our future. The private sector has an important role to play. In most Middle Eastern countries, indeed globally, environmental and infrastructural services have been in the hands of the state, and have been costly, inefficient and poorly managed. Promoting environmental industries and the privatization of the public environmental sector are key steps to be taken. External interest and involvement will encourage a more stable Middle East to prevail, an achievement that would be in the everyone's interests.

The international community should be careful, however, not to put all their eggs in one basket because of their euphoria over the Israeli-Jordanian peace treaty. There is little point in fastening economic ties and promoting interdependence only along one border. If, when it comes to the final resolution of the Israeli-Palestinian dispute, the wells of international generosity have run dry, hopes for comprehensive regional development will be cut short, with negative repercussions throughout the region.

Annex 1

Cloud seeding's potential impact on West Bank rainfall is shown below. These calculations assume a 15% increase in annual rainfall, a figure that is based on experimentation in Jordan, Israel and the USA (IWEC, 1993). Rainfall quantities are derived from PLO (1990) and Boardman, Foster and Dearing (1990)

	Current rainfall (mcm)	Potential total (mcm)	Potential increase (%)
Total	2848	3275.2	427.2
Percolation	740.5	851.575	111.075
Surface run off	179.4	206.31	26.91
Evapotranspiration	1928.1	2217.315	289.215

Annex 2

Wastewater. The potential water saving if comprehensive wastewater treatment was introduced are shown below. Calculations assume that 70% of domestic wastewater could be re-used, a figure derived from Shuval (1994). Domestic use and wastewater re-use figures are for 1990, and are taken from Isaac et al (1994a), Gleick (1993), Zarour and Isaac (1991) and ROID (1993). It would have to be assessed, of course, whether connecting isolated villages to national collection systems would be economically feasible.

	Domestic use (mcm)	Current wastewater re-use (mcm)	Potential wastewater re-use increase (mcm)
Jordan	179	36	89.3
Palestine	78	0	54.6
Israel	340	118	120.0
Total	597	154	263.9

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