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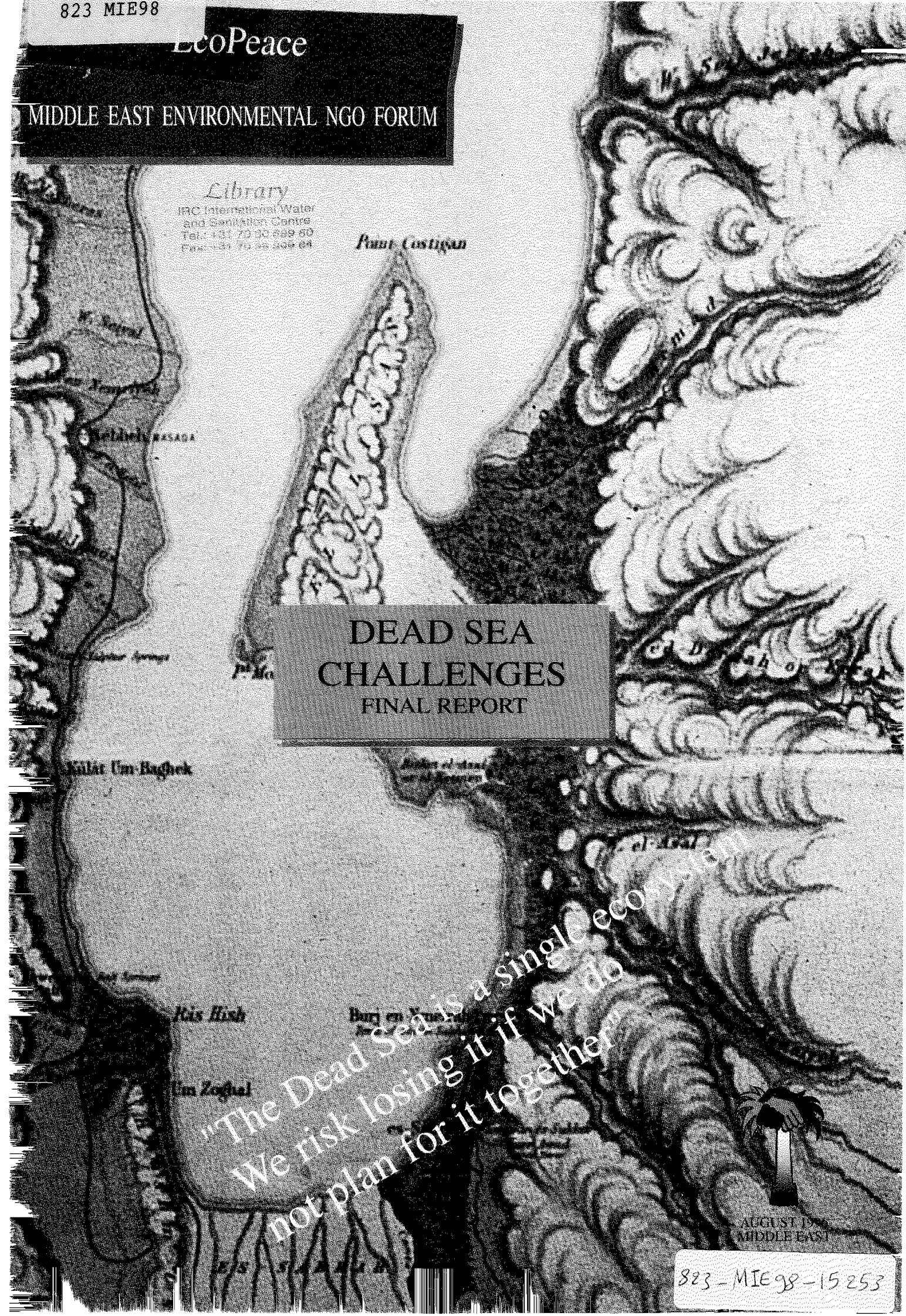
Point Castigan

DEAD SEA
CHALLENGES
FINAL REPORT

"The Dead Sea is a single ecosystem.
We risk losing it if we do
not plan for it together."

AUGUST 1998
MIDDLE EAST

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A Note of Gratitude

EcoPeace would like to thank the World Environment Centre (WEC) and the United States Agency for International Development (USAID), for their support and assistance in enabling this review project to take place.

Special thanks are expressed to Mahmoud Al Khoshman, Eli Raz, Husam Abu Faris and Ra'ed Daoud, for preparing the sectoral reports and for taking the time to present them to the public.

The public meetings would not have taken place without the efforts of the following organisations:

The Society for Protection of Nature in Israel

Life and Environment - Israeli NGO Umbrella Organisation

The Royal Society for the Conservation of Nature / Jordan

The Royal Society for Ecological Diving / Jordan

Special thanks go to the staff of EcoPeace, and to the Palestinian, Israeli, Jordanian and international public that took part in the public meetings and gave us their comments and suggestions.

Note: The opinions expressed herein are those of EcoPeace and do not necessarily reflect the views of the World Environment Centre or the US Agency for International Development.

Executive Summary

People come to the Dead Sea for many reasons. They come in awe of its geographic formation- a deep blue sea, surrounded by high mountain cliffs on its eastern and western flanks. They come for its waters, rich in minerals for the relief of human ailments or for the purposes of extraction for industrial uses. They are attracted by its unique fauna and flora, that traverse the cliffs, live in its side wadis and fresh water springs, or fly high above in the sky. They are amazed by its cultural heritage, where for thousands of years people have sought refuge in the silence and solitude of its harsh climatic conditions. Some people come to the Dead Sea simply because it is the lowest place on Earth.

Three people share the vicinity around the Dead Sea: Palestinians, Jordanians and Israelis. In an effort to raise living standards and advance peace between these ancient peoples, the Dead Sea has now been earmarked for rapid development. Fifty thousand new hotel rooms, international highways, industrial expansion and increased water extraction have all been proposed in recent years in order to "maximise the potential" of the Dead Sea.

Many people are concerned that the development proposed will destroy the very reasons that bring people to the Dead Sea in the first place. Over 200 persons, mostly Palestinian, Jordanian and Israeli, expressed their concern for the Dead Sea in two public meetings organised by EcoPeace.

Entitled the "Dead Sea- Future Challenges", these meetings were held in June 1996 in Amman and Tel-Aviv respectively. This report attempts to summarise presentations made at these two public meetings in a way that incorporates the many public comments that were made.

The main conclusion that can be drawn from these public gatherings is that it is not necessarily the nature of the development that is planned for the Dead Sea, but the lack of coordinated planning between Jordanians, Palestinians and Israelis that is the basis of public concern.

At EcoPeace we specially conclude that there is a need to:

- a) Create a Dead Sea International Joint Commission
- b) List the Dead Sea as a World Heritage Site
- c) Develop a tourism master plan for the Dead Sea
- d) Conduct archaeological and biodiversity surveys and studies
- e) Develop a master Water Utilisation Plan for the whole Jordan River Basin
- f) Keep International Highways away from Dead Sea shores
- g) Support sustainable transport for the Dead Sea
- h) Cease production of ozone depleting bromide
- I) Audit the environmental impact of the Dead Sea Potash Industry

For our part we welcome you to support and/or comment on our conclusions and recommendations discussed in this report and invite you to join a public interest Dead Sea Committee that we are creating to further our objectives.

ملخص

يزور الناس البحر الميت لاسباب عدة: يزورونه لتكوينه الجغرافي الفريد من نوعه - بحر ازرق عميق محاط بمنحدرات جبلية شاهقة على ضفافه الشرقية والغربية، يزورونه من اجل مياهه - الغنية بالمعادن والشفافية للامراض، يزورونه لاستخراج المعادن واستخدامها في الصناعة يزورونه مشدوهين بالحيوانات والنباتات الفريدة من نوعها على امتداد منحدراته وتعيش بالوديان بجانب ينابيع المياه او تحلق عاليا في سمانه. يزورونه لاصالة حضارته على مدار آلاف السنين حيث توجهوا اليه طلبا للسكون والخلود للنفس في ظل ظروف مناخه القاسية. يزورونه فقط لكونه البقعة الاكثر انخفاضاً على سطح الارض.

تشارك بالبحر الميت ثلاث شعوب: فلسطينيين و اردنيين واسرائيليين، وفي محاولة لرفع مستوى المعيشة ودفع عجلة السلام بين هذه الشعوب العريقة تم تحديد منطقة البحر الميت كمنطقة تطوير سريعة، خمسون الف غرفة فندقية جديدة وطرق دولية سريعة وتوسيع صناعي وزيادة لاستغلال المياه هي مجمل المقترحات خلال السنوات المنصرمة لتعزيز مكانة البحر الميت، الا ان العديد يرى ان المشاريع التطويرية المقترحة ستدمر تلك العوامل التي تجلب الناس الى منطقة البحر الميت، اكثر من مائتي اردني وفلسطيني واسرائيلي عبروا عن قلقهم لوضع البحر الميت خلال مؤتمري نظمتهما منتدى البيئة والسلام "EcoPeace" البحر الميت - التحديات المستقبلية - عنوان المؤتمر اللذان عقدا في حزيران ١٩٩٦ في كل من عمان وتل ابيب.

يهدف هذا التقرير لعرض موجزا لما تم تقديمه اثناء المؤتمر مع الاخذ بعين الاعتبار آراء الحضور. النتيجة الرئيسية التي يمكن استنتاجها من هذه المؤتمرات هي ان القلق الحقيقي للمشاركين وعامة الشعب لا يكمن في طبيعة مشاريع التنمية المقترحة للبحر الميت فحسب وانما في حقيقة غياب التنسيق والتخطيط المشترك بين الدول المشاطئة للبحر الميت ايضا.

ونحن في منتدى البيئة والسلام نرى ان هناك ضرورة الى:

- ١ - تعيين لجنة اقليمية مشتركة للبحر الميت.
 - ٢ - اعتبار البحر الميت ضمن قائمة المناطق التي يمكن تصنيفها كتراث عالمي.
 - ٣ - تطوير خطة سياحية شاملة للبحر الميت.
 - ٤ - اجراء دراسات وابحاث حول الاتار والتنوع الحيوي بالمنطقة.
 - ٥ - تطوير خطة شاملة لاستخدامات المياه لمنطقة غور الاردن.
 - ٦ - ابقاء الطريق الدولي السريع بعيدا عن شواطئ البحر الميت.
 - ٧ - دعم سياسة طويلة الامد للمواصلات للبحر الميت.
 - ٨ - التوقف عن انتاج البروميدي (Bromide) الذي يؤدي لاضمحلال طبقة الاوزون.
 - ٩ - اجراء بحث عن الاتار البيئية لصناعة البوتاس في البحر الميت.
- من جهتنا نرحب بملاحظاتكم او / ودعمكم لتوصياتنا والنتائج الواردة في التقرير. ندعوكم للانضمام الى اللجنة الجماهيرية المهتمة بالبحر الميت والتي سنقوم بتأسيسها لتعزيز اهدافنا.

תקציר

אנשים מבקרים בים המלח מסיבות רבות. הם באים מתוך התפעלות מהופעתו הגאוגרפית. ים כחול עמוק מוקף צוקי הרים מצידו המזרחי והמערבי. הם באים על מנת להשתמש במימיו העשירים במינרלים המרפאים מחלות אנשו או על מנת להפיק ממנו חומרים למטרות תעשיתיות. הם גם נמשכים לצומח ולחי היחודיים השוכנים בצוקיו, החיים בואדיות, כמעונות המתוקים או מרחפים להם אי שם גבוה בשמיים.

אנשים אלו מתפעלים מהמסורת התרבותית של האיזור שבו במשך אלפי שנים מצאו בני האדם מקלט בטקט ובבדידות הנובעים מהתנאים האקלימיים הקשים הקיימים באיזור.

ישנם המגיעים לים המלח, כשוט, בגלל שזהו המקום הנמוך ביותר עלי אדמות.

שלושה עמים חולקים את סביבות ים המלח: הפלשתינאים, הירדים והישראלים. במאמץ להעלות את רמת החיים ולקדם את השלום בין עמים אלו, סומן ים המלח כאתר לפיתוח מהיר. המישים אלף חדרי מלון חדשים, אוטוסטרדות בינלאומיות, פיתוח תעשייתי והפקת מיים מוגברת - כל אלו הוצעו בשנים האחרונות על מנת להגדיל את הניצול הפוטנציאלי של ים המלח.

אנשים רבים מודאגים מהאפשרות שהפיתוח המוצע עלול להרוס את אותם סיבות עצמם המביאות אנשים כה רבים לים המלח. יוחר ממאתיים איש, רובם פלשתינאים, ירדנים וישראלים, הביעו את דאגתם לעתיד ים המלח בשני כנסים שאורגנו על ידי EcoPeace.

מפגשים אלו שכתרתם היתה "ים המלח - אתגרי העתיד" התקיימו ביוני 96, בעמאן / רבת עמון ובתל אביב. דו"ח זה מנסה לסכם את ההרצאות שנישאו במפגשים אלו באופן שיכע נאמנה את מגוון הדעות הציבוריות שהושמעו.

המסקנה העיקרית שניתן להסיק ממפגשים אלו היא שלא האופי התכנוני של הפיתוח המיועד לים המלח הוא שמפריע כי אם העדר התכנון - המתואם בין ירדנים, פלשתינאים וישראלים הוא המהווה את הבסיס לדאגת הציבור.

אנו ב- EcoPeace הצבענו במיוחד על הצורך

- 1 - ליצור ועדה בינלאומית משותפת לענייני ים המלח.
 - 2 - להכריז על איזור ים המלח כעל איזור מסורת עולמי (המיועד לשימור).
 - 3 - לפתח תכנית אב לתירות בים המלח.
 - 4 - לערוך סקרים ומחקרים ארכאולוגיים וביולוגיים להערכת מגוון החי והצומח באיזור.
 - 5 - לפתח תכנית אב לניצול מיים עבור כל אגן ההיקוות של הירדן.
 - 6 - להרחיק אוטוסטרדות בינלאומיות מחופי ים המלח.
 - 7 - לתמוך בתחבורה בת קיימא עבור ים המלח.
 - 8 - להפסיק את ייצור המתיל ברומיד הפוגע בשכבת האוזון.
 - 9 - לבקר/להעריך את ההשפעה הסביבתית של תעשיית האשלג בים המלח.
- אנו מזמינים אותך לתמוך או להעיר הערות על המסקנות וההמלצות הנדונות בדו"ח זה כמו כן הינך מוזמן להצטרף לוועדה הציבורית לענייני ים המלח שאנו מקימים על מנת לקדם את מטרותינו.

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1. Introduction

The Middle East Peace process has brought to the region renewed international attention and support for rapid development. However, environmentalists have quickly come to realise that alongside any economic benefits that development may potentially yield, there lie some serious environmental concerns that need to be addressed. Any massive development in our region, if not planned and managed wisely, is likely to irreversibly damage the environment in which we live.

The Dead Sea and its surroundings are an example of a shared natural resource which holds tremendous potential for development. It is also, a unique and highly sensitive ecosystem, where poorly planned development on its shores will have grave environmental consequences, such as harming its flora and fauna as well as lowering the water level.

EcoPeace has therefore reviewed current development proposals for the area. The main objective of this review, is to promote a holistic approach to the development of the Dead Sea -- one that takes environmental considerations into account. Our review project aims at:

Promoting public education and public participation in the development process.

Developing environmentally sound recommendations to proposed projects and monitoring their implementation.

Opening and facilitating effective channels of communication between the environment community, government, entrepreneurs and the general public.

By working together to promote the sustainable development of the Dead Sea we at EcoPeace are deepening and strengthening the ties between the people of our region, and inevitably helping to ensure a solid and sustainable peace

Methodology

This final report on development of the Dead Sea was prepared by EcoPeace in the following stages:

1) EcoPeace compiled and published an Inventory of Development Projects planned for the region, as presented by the Egyptian, Israeli, Jordanian and Palestinian delegations to the Summit meetings in Casablanca in 1994 and in Amman in 1995. This Inventory was then distributed throughout the region for specific suggestions as to which areas call for immediate further review.

2) After extensive deliberations, the Dead Sea was selected by EcoPeace for further review. Four specialists from the region were selected, each asked to review a different sector -- tourism, water, industry & energy, and transportation. Each specialist prepared a draft position paper describing current environmental conditions, the environmental impacts of proposed development and ways to minimise these impacts.

3) The papers were then presented to the public in two meetings held on June 6 and June 13 1996, in Tel Aviv and in Amman respectively. Following the meetings, the specialists discussed all relevant feedback, comments and suggestions as expressed by participants at the two public meetings. The draft position papers and the deliberations of the public were then summarised by EcoPeace, and compiled into this single final report.

Future Goals

EcoPeace's primary goal is to promote development around the Dead Sea which is sustainable and seriously considers environmental factors. In this way we can hope to reap the maximum fruit from development brought by the peace process, while conserving our vital and scarce natural resources, and preserving those natural and cultural assets which have made our region so attractive in the first place.

EcoPeace proposes to create a Dead Sea Committee, whose task will be to monitor and promote implementation of the recommendations made in the final report. The Dead Sea Committee will be comprised of Palestinian, Jordanian and Israeli representatives from various sectors including universities, private sector companies, local municipal councils and others, so as to have a wide consensus of people who will support the recommendations of this report. This report will thus become the basis of a dialogue between the Committee and decision makers in the region.

- * Any massive development in our region, if not planned and managed wisely, is likely to irreversibly damage the environment in which we live.
- * Each of the following four sectors will be reviewed: tourism, water, industry and energy, and transportation.
- * EcoPeace's primary goal is to promote development around the Dead Sea which is sustainable and seriously considers environmental factors.

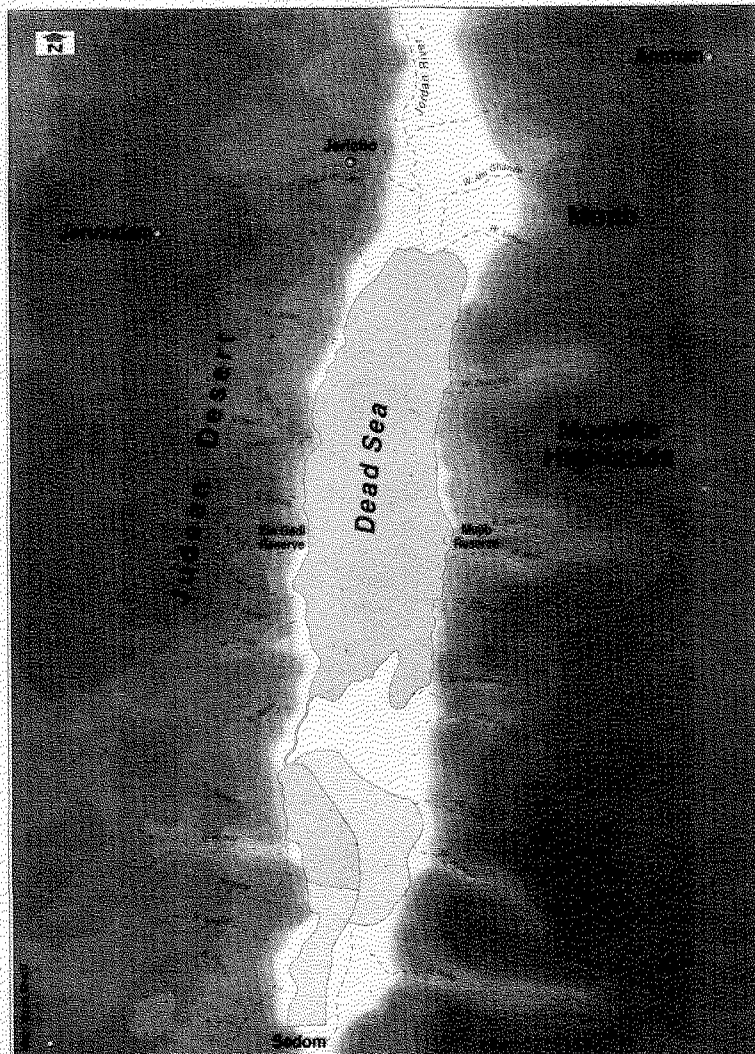
2. Dead Sea: Environmental Characteristics

The Dead Sea is the saltiest, most dense non-shallow body of water on the planet. Its ionic composition is unlike any other salt water body, and its shores are the lowest place on Earth. This remarkable unique environment is highly sensitive to even the slightest change, whether natural or man-made. Since the middle of the present century the Dead Sea has been shrinking steadily, mainly due to human interference with its water balance. During the 1980's its level dropped at an average rate of 65 mm/year.

Geography

The Dead Sea region includes the sea, its shores and surrounding areas including the plains of Jericho and Moab on either side of the Jordan River in the north, the Sedom plain in the south, the slopes of the Moabite highland (the Belka) in the east, and the Judean Desert with its coastal strip in the west.

Topographical Map of The Dead Sea



Environmental Characteristics

The water level of the Dead Sea currently stands at 410 meters below sea level. It is approximately 50 km in length, and its maximal width (south of Ein Gedi, opposite the Arnon/ Mujib Creek) is 17 km. Its volume is about 140 billion cubic meters of water, in which about 50 billion tons of various solids are dissolved. The sea is situated in the Jordan Rift Valley (JRV), which is part of the 6,500 km Syrian-African fault.

The Dead Sea depression where the sea lies, is long, narrow and deep in relation to the surrounding areas. Its eastern and western borders are emphatically demarcated by the fault scarp of the Judean Desert and the steep slopes of Moab. The northern and southern shores reach the flat plains of Sedom and the Jordan Valley.

Because of the steepness of the eastern shores there is no coastal plain on that side, and the dropping level of the Dead Sea causes no horizontal shoreline migration, nor does it expose mudflats, as it does on the western side. Beyond the mudflats and back of the shoreline, on the western side rises the forbidding wall of the fault scarp, a formidable obstacle to any road attempting to connect the coastal strip with the flatlands of the Judean Desert beyond.

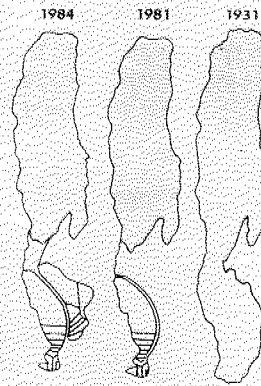
Soils in the area are of an unconsolidated alluvial and ancient lake sedimentary type, consisting mostly of saturated clays and salts. Bedrock exists at a great depth from the soil surface.

Climate

The region's climate is hot and arid, though the areas near the sea receive some humidity and breezes. Mediterranean breezes that reach the area from noon onward, especially in the summer, heat up adiabatically as they cross the Judean Desert and plunge off the fault escarpment, but pick up moisture as they blow across the sea towards the eastern shore.

Water Sources

Springs are quite common on the eastern slopes, which receive more rainfall than the Judean Desert and therefore also carry some semi-permanent brooks. Along the western shores there is a cluster of springs in the north but none in the south, and brooks flow only in the two oasis valleys of 'Ein Gedi. The water inflows however have been dropping steadily on the western side due to increased development. This can be demonstrated by the following figures: in 1900 the estimated annual inflow of water to the Dead Sea from side wadis was close to 1.2 billion cubic meters. In 1940 this figure dropped to approximately 900 million, in 1960 to 810 million, and in 1985 to 125 million cubic meters.



Raz, Eli The Dead Sea Book, Nature Reserve Authority, Tammar Regional Authority, Israel. 1993

Flora & Fauna

The shores of the Dead Sea and the oases in its vicinity preserve a rare blend of desert biota and bio-geographic relics, which have survived in the isolation of the surrounding desert. Several animals have been separated from their species' gene pool long enough to evolve into subspecies, and even local endemic species. The presence of the latter is especially significant. The oases ponds of 'Ein Feshha on the western shores are inhabited by both the tropical river fish *Oreochromis aureus* and by the Red Sea interloper *Aphanius dispar richardsoni*, and by *Aphanius mento*, (currently endangered with extinction) a relative from Asia Minor - a witness to those times when the Orontes, the Litani and the Jordan rivers were hydrographically connected.

The Mujib basin on the eastern shores contain an endemic species of fish, *Gara Gorehmensis* and an endemic dragon fly *Caloptryx Syriaca*, which together are the optimum indicators of water quality. The Mujib Basin has been identified as an important bird and wetland area by Birdlife International and the International Waterfowl and Wetlands Research Bureau. Evidence of breeding activities for the globally threatened, Griffon Vulture, Lesser Kestrel and the Egyptian Vulture have recently been found. Other globally threatened migratory bird species such as the Black Stork, *Ciconia Nigra* and White Stork, *Ciconia Ciconia*, also depend on the Dead Sea on their migration path.

Tropical African (Sudanic) trees are also found, such as *Salvadora persica* and *Moringa peregrina*, which are habitat to local moths such as *Calotis* spp., and other arthropods. Endemic birds found in the oases, include *Onychognathus tristrami*, *Falco concolor* and *Corvus rhicudo*. A rare subspecies of the Euro-Asian boar *Sus scrofa* lives in the oasis and in the marshes of the Sodom playa, together with the desert gazelle *Gazella dorcas*.

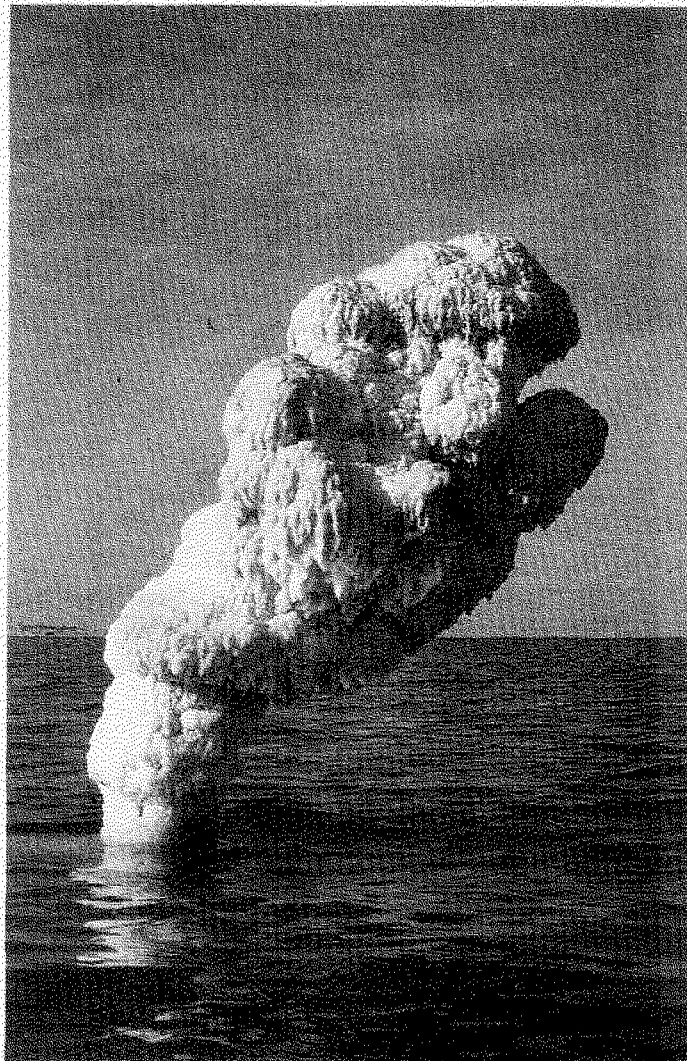
The 'Ein Gedi mole viper, *Atractaspis engadensis*, appears to have speciated within the Rift Valley, as has a species of the alga *Enteromorpha*. Four species of shrimp, found in subterranean springs along the northwestern shore of the Dead Sea, appear to have evolved from Mediterranean sea forms.

Many vertebrates such as leopards, hyenas, the *Capra ibex nubiana* (Nubian Ibex), the *Procavia capensis* (Rock Hyrax), the Jungle Cat, the Blanford fox, the Egyptian mongoose, the Caracal, the green toad, and others, live in the oases along the Dead Sea shores. There is also a wide variety of birds and insects.

Environmental Characteristics

It should be emphasised that the observed endemism and bio-geographic coexistence are biological rarities, confined to small biotopes that are easily disturbed.

As the environmental characteristics of the Dead Sea indicate, a delicate internal balance exists within the ecosystem that is the Dead Sea. By altering any environmental components of this existing ecosystem we may be damaging places of shelter or mating, or destroying food sources. All these may eventually result in the extinction of certain plants, insects, birds, or other species. Disturbing the existing natural balance can have far-reaching consequences that we can not necessarily anticipate. As we review sectoral proposals for development this must be kept in mind, as we might be interfering with things that we do not yet fully know or understand.



A tree of stone next to En Gedi. It died approximately 600 years ago as a result of a rise in sea-level, and was preserved in place until its exposure with the drop in the sea-level of the 70s.
Raz, Eli *The Dead Sea Book*, Nature Reserve Authority, Tammar Regional Authority, Israel. 1993

3. SECTORAL REVIEW

A. INDUSTRY AND ENERGY

A.1. Existing Conditions

Two main industries currently exist along the southern shore of the Dead Sea: The Arab Potash Company (APC) on the Eastern shore, and the Dead Sea Works (DSW) on the western shore.

The APC was established in 1956, and began potash production in 1983, with an initial capacity of 1.2 million tons per year. In 1986, after modifying the solar ponds system which enhanced ore production, capacity increased to 1.4 million tons/year. A second plant, based on advanced technology, was built in 1993 with a capacity of 0.4 million tons/year, which brought the total production capacity to 1.8 million tons/year.

The DSW was established in 1930 to extract the Dead Sea minerals. Its potash processing operations are similar to those of the APC, and its production capacity is 2 million tons/year. In addition to potash, the DSW produce the following:

Salt (NaCl):	50,000 tons/year
Magnesium Metal:	25,000 tons/year
Bromine:	180,000 tons/year
Cosmetic products such as bathing salts and medical mud.	

A.2 Proposed Developments

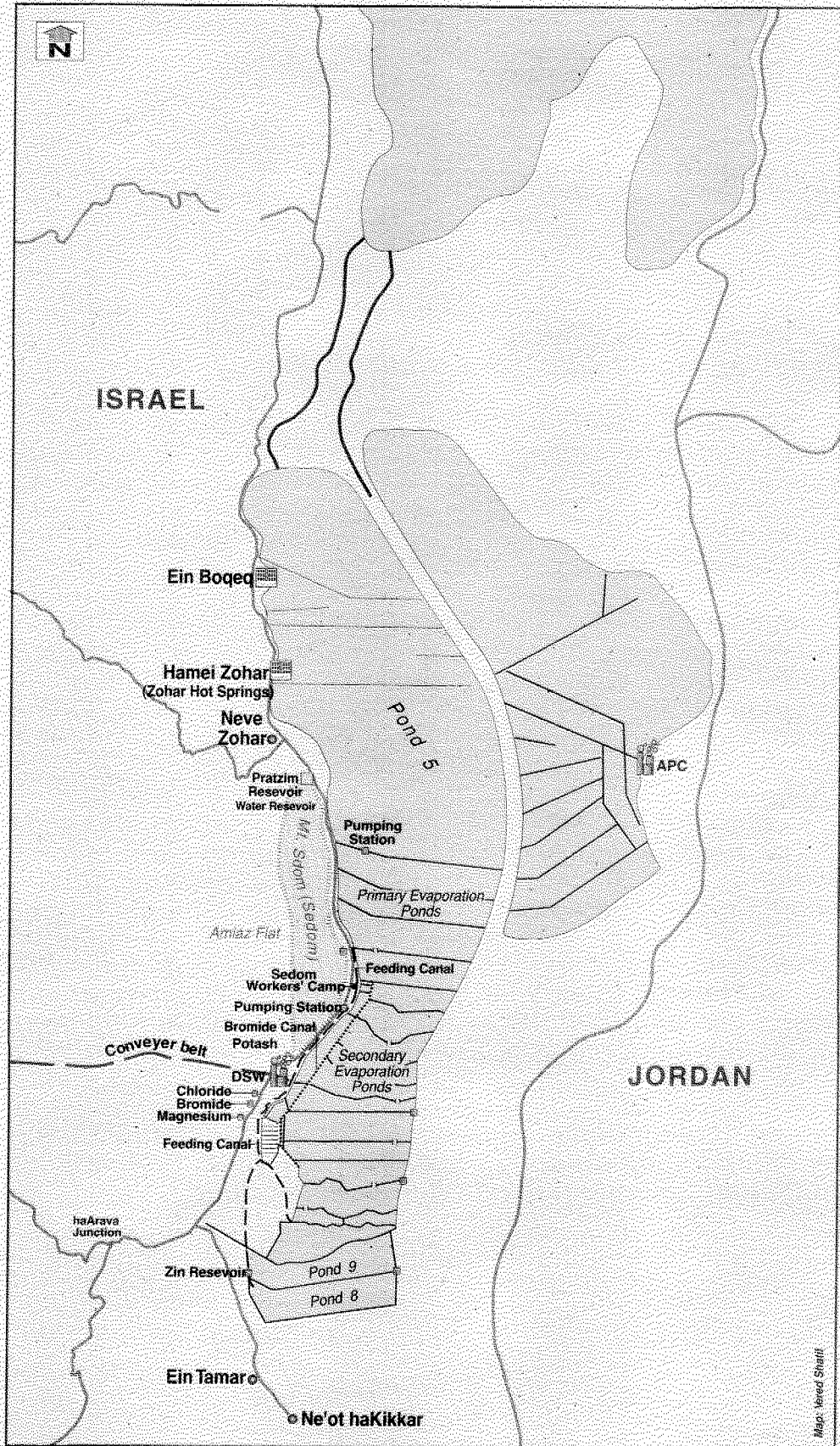
The Dead Sea is a key resource in the area, combining a unique mineral content and concentration of Dead Sea brine, a high evaporation rate, and a dry climate which permits open-air storage of potash and other products. The DSW and APC are two exclusive investors in the area, operating according to concession grants given to them by the Israeli and Jordanian governments. This means that their realm of activity is wide and they enjoy a great deal of independence.

The new industrial projects for the area are all proposed by the APC, and include the following:

1. Production of Potassium Sulphate (75,000 t/y) and Di-Calcium Phosphate (52,000 t/y)/
2. Construction of a second cold crystallisation plant to increase production capacity to 2.2 million t/y in 1998.
3. Production of Magnesium Oxide.
4. Establishment of modern production facilities for potash, bromine and its derivatives, magnesium, and other Dead Sea minerals.
5. A plant for industrial and table salt, with a capacity of 1 million tons/year, is currently under construction.

Bromide production is of especially great concern to the environmental community. According to the Vienna Convention for the Protection of the Ozone Layer, Israel must cease its bromide production by the year 2001, while Jordan, as developing country, has until 2011 to do so. The Israeli DSW appear to have entered into a joint venture with the Jordanian APC to move the Israeli plant to the Jordanian side in order to operate for an additional ten years, an obvious attempt to avoid the convention..

Industrial Activities



A.3 Environmental Impacts

The two most significant environmental impacts of the industrial sector on the Dead Sea are the use of large quantities of energy and water (both fresh and Dead Sea waters), and the destruction of habitat caused by extreme alterations to the landscape.

The operations of the industrial complexes at the southern shores of the Dead Sea have, in fact, significantly contributed to the drying up of the Dead Sea. The Dead Sea is currently divided into two distinct parts: a northern natural sea, and southern man-made and geometrically shaped solar evaporation ponds.

During the 1970's, due mainly to human interference, the Dead Sea's water level dropped drastically, so that by the end of the decade the waters in the Lynch Strait (the "Tongue") were very shallow and concentrated. In addition, highly saline and concentrated waters were being returned to the sea by the DSW through the strait.

These factors caused the formation of large salt reefs, which blocked the free flow of water from the northern to the southern part of the sea. The DSW were then forced to dig a canal in order to ensure the flow of water to the solar evaporation ponds. In 1977 the Dead Sea level dropped further. The natural water bodies still existing in the south dried up, so that all that was left were the ponds. In the early-mid 1980's solar ponds of a comparable size were created on the eastern side.

It is estimated that between 25-30% of the total evaporation of the Dead Sea waters can be attributed to the solar ponds. The ponds increase the Dead Sea's surface area, which causes increased evaporation, which in turn causes the sea to shrink further. If the existing industries continue to operate as they have been, and, in addition, water continues to be diverted from the Dead Sea, it may not be long before the Dead Sea dries up completely.

Extraction and processing of the Dead Sea minerals are highly water consuming. The APC, for example, consumes about 23% of Jordan's total industrial water supply (7.3 MCM out of 32.2 MCM). The industrial activities also cause over-exploitation and salinization of groundwater aquifers.

Air quality is negatively affected by emission of dust and combustion gasses from industry. The burning of heavy fuel oil in power and steam generators emits gasses consisting of carbon dioxide and sulphur dioxide with smaller amounts of carbon monoxide and nitric oxide. It is also likely that other hazardous gases are being emitted into the atmosphere.

The APC and DSW have also caused major alterations to the landscape scenery, by building their industrial complexes and by undertaking extensive mining in the area. Their boiler and dryer stacks also break the natural skyline.

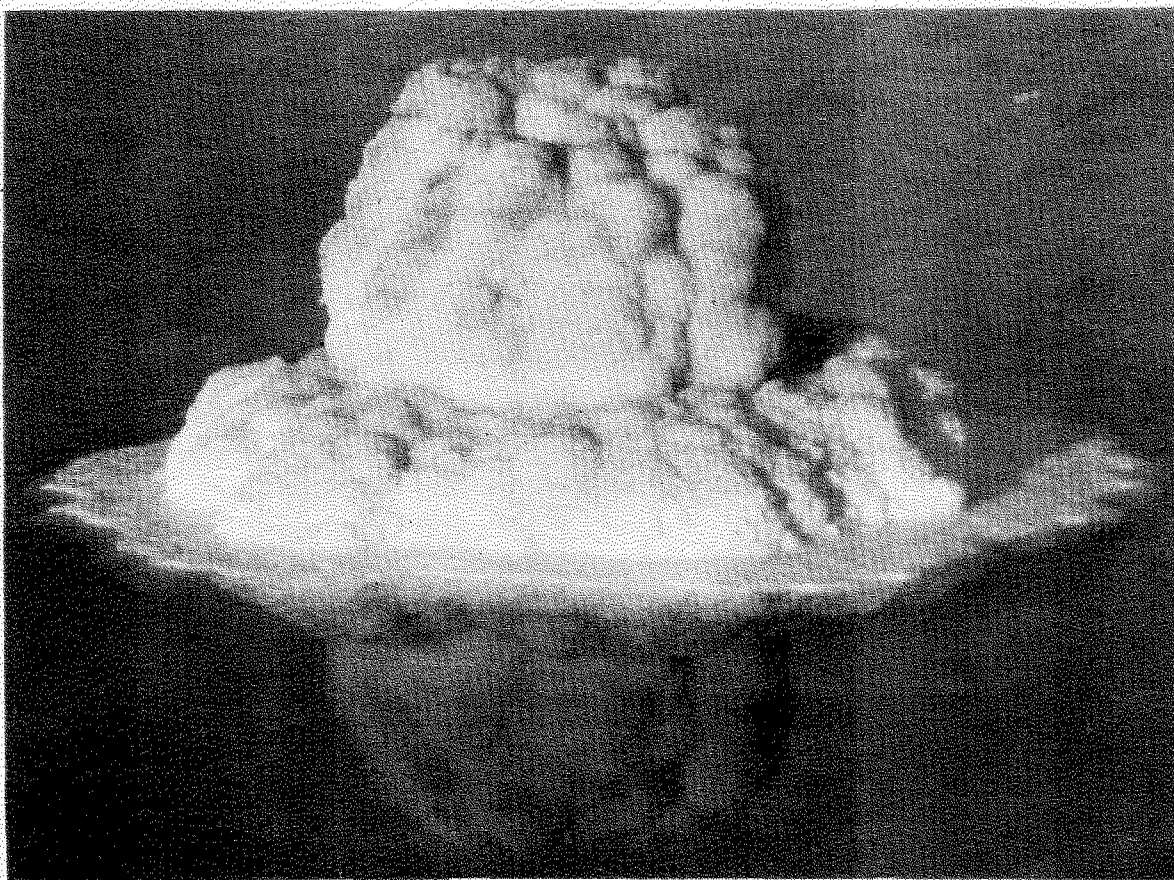
A.4 Recommendations

Any agreement between the APC and the DSW regarding the relocation of the bromide plant to the Jordanian side of the Dead Sea, appears to be contrary to the spirit of the Vienna Convention. The DSW should therefore cease methyl bromide production by the year 2001 as required by the Convention, and not relocate production to the Jordanian side of the Dead Sea.

A detailed independent environmental audit of the existing industries needs to be conducted, to assess their compliance with emission standards and environmental regulations.

Because industrial activities of the DSW and APC are significantly contributing to the disappearance of the Dead Sea, through the increase in evaporation, an assessment is also urgently needed as to the long-term benefits of the potash industry vis a vis their negative impacts on other development sectors such as tourism.

- * If industry continues to operate in then same way, and in addition, water continues to be diverted from the Dead Sea, it may not be long before the Dead Sea dries up completely.
- * An assessment is urgently needed to identify the long-term effects of industry on the Dead Sea.



Raz, Eli *The Dead Sea Book*, Nature Reserve Authority, Tammar Regional Authority, Israel. 1993

B) WATER

The Dead Sea is part of the Jordan River Basin. Its water supply is dependent upon the Jordan River, the Yarmouk, and all other tributaries to the river. The area of reference when discussing water issues related to the Dead Sea is, therefore, the entire Jordan River Basin.

B.1 Existing Conditions

Many water projects were implemented in the JRV and Dead Sea area during the last decade. They were aimed mainly at utilising the waters of the Jordan River, the Yarmouk and the other wadis which flow into the Dead Sea, for domestic and agricultural purposes. These projects included:

Israel Water Carrier: This is the biggest water project in the area, which utilises the upper Jordan River, upstream from where it merges with the Yarmouk River. The project includes saline water separation from the springs north and west of the Sea of Galilee, using a saline water carrier which surrounds the lake and then discharges the water into the Jordan River.

King Abdallah Canal (KAC): This canal is the main water project on the eastern side of the Jordan River. The canal receives its water supply from the Yarmouk River, as well as from side dams. Canal water is used for irrigation and some of it is pumped to Amman for drinking purposes by a pumping station near Deir Alla.

Side Dams: These include King Talal Dam, Kufrien Dam, Ziglab Dam, Bissan Dam. They were constructed on the side wadis to store and utilise the base and flood water from these wadis for irrigation.

Spring Utilisation: These springs include Farih, 'Auja, Sultan, Wadi Hasa, 'Ein Maghara, Wala, Mujib, 'Ein Gedi, 'Ein Boqeq, and others. The waters of the springs are used mainly for agriculture along the wadis and ghors, and rarely reach the sea.

B.2 Proposed Diversion and Development Projects

Developments That Will Further Reduce the Water Flow to the Dead Sea:

Israel:

- * Adassiyya diversion dam
- * Storage system on the Jordan River:
 - Abu Sus dam on the Jordan River
 - Side storage reservoirs
- * Desalination of Lake Tiberias/Sea of Galilee springs
- * Pipeline along the KAC for conveyance of desalinated water.
- * Desalination of brackish water in the Dead Sea area
- * Waste water treatment in the upper Jordan River

Palestinian National Authority (PNA):

- * West Ghor Canal Project
- * Side wadi dams - Fri'ah, Auja and Qelt
- * Development of the springs
- * Water Harvesting Project - pools, retention dams
- * Wadi Ennar (east of Jerusalem) - waste water treatment plant

Israel and the PNA:

- * Desalination of brackish water in the JRV

Jordan:

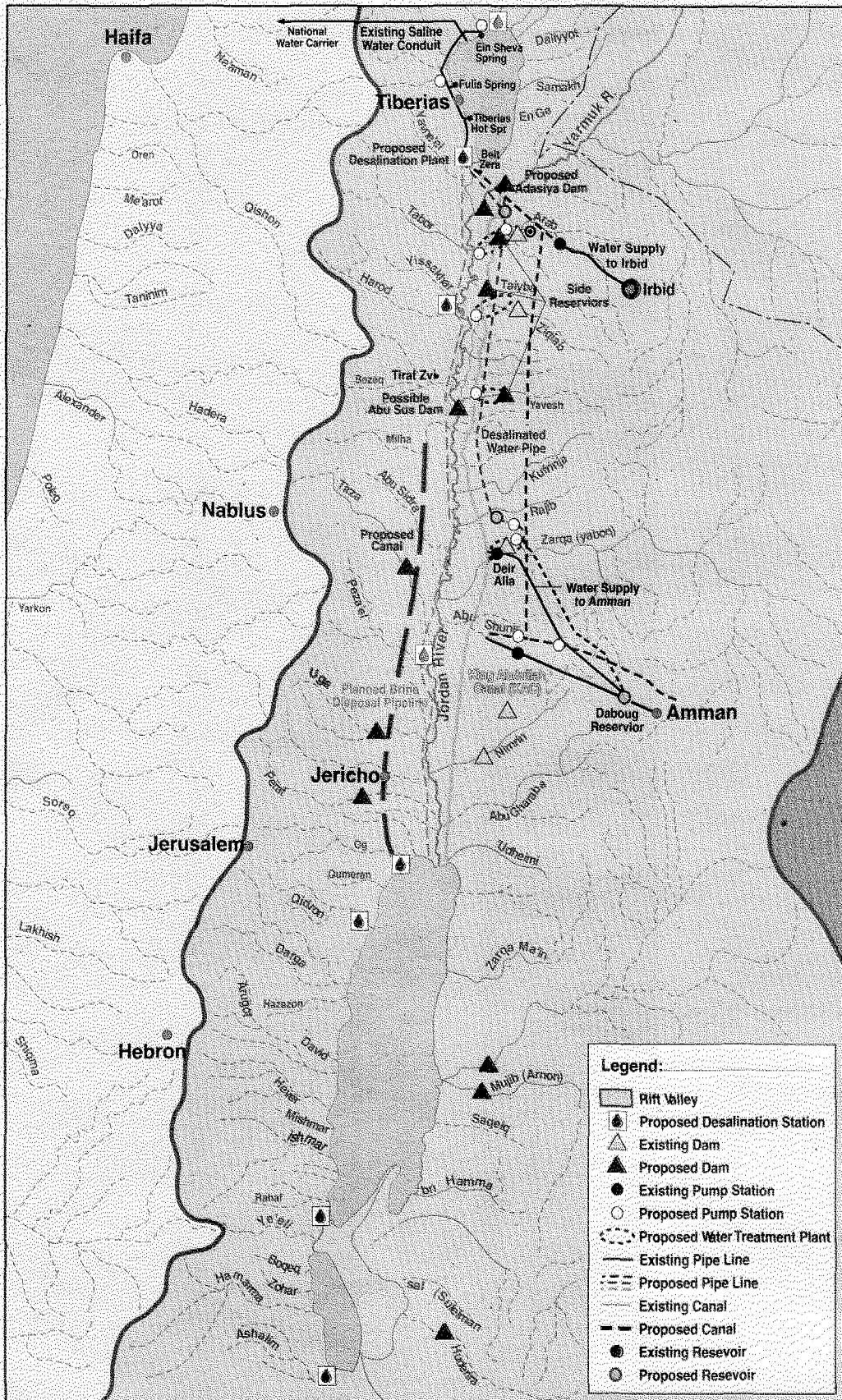
- * South ghors project
- * Unity dam
- * Waste water collection and treatment in the ghor area
- * Mujib dam
- * Karameh dam

Developments That Will Raise and Maintain the Level of the Dead Sea:

- * Mediterranean or Red Sea - Dead Sea Canal for hydropower production and water desalination.
- * Restoration of the lower Jordan River.

Sectoral Review

Proposed Water Development



B.3 Environmental Impacts

The building of more dams and canal projects threaten to further reduce the already low water inflow to the Dead Sea. Theoretically, new water diversion projects, when combined with the current impacts of industry on water loss and increased fresh water demands of the expanding tourist industry, may well result in the complete drying up of the Dead Sea.

Even the plans to treat polluted waters currently emitted into the Jordan River might be a mixed blessing. If the treated waters are to be removed and applied to agriculture, as most likely the case, then these projects too will lead to further reduction of the water level of the Dead Sea.

The building of proposed canals linking the Dead Sea with either the Mediterranean or the Red Sea may also have negative effects alongside the positive ones. Ostensibly, while the canal projects would appear to solve the problem of the disappearing Dead Sea, they would also create their own potentially heavy negative environmental impacts. These include the contamination (through leaching) of fresh water aquifers along the canal paths, and the opening up to development of still pristine open spaces. In addition, the mixing of the waters of the two seas may lead to the creation of gypsum, and to the possible “overturning” of the Dead Sea.

B.4 Recommendations

It is apparent that a master plan for the utilisation of the Jordan River Basin’s water resources is urgently needed. There are tremendous conflicting interests here at stake. If all the water development projects were to go ahead then the Dead Sea would further disappear. This would damage the investments, current and proposed, of the tourism and industrial sectors.

The main demand for the water being diverted from the Jordan River Basin is the agricultural sector. We therefore witness a direct conflict between the agricultural sector, the tourism industry, the Potash industry and of course the environmental value of maintaining the integrity of the Dead Sea itself. Therefore, as part of the development of a master plan there is a need for open discussion both nationally and regionally and between the different sectors who rely on the waters of the Jordan River Basin, as to what the appropriate water allocation quantities for each sector are.

Without a fair and equitable compromise being reached, the currently proposed water development projects threaten to dry up the Dead Sea. Facilitating such compromise and public discussion should be a major task of the proposed Dead Sea Committee. Techniques for the conservation of water and for the reuse of waste water need to be implemented, particularly in relation to plans for the expansion of the tourist industry.

Sectoral Review

Hotels must be required to minimise their water demands by utilising water saving technology, as well as by treating all waste water for reuse.

In the long term desalination projects may be required but priority should be accorded to desalination of local spring water and saline aquifers. Saline water could be directly used where possible, since it is abundant in the aquifers in this area.

- * The conflicting interests and water needs of the different sectors threaten to dry up the Dead Sea completely.
- * There is need for an open forum between different sectors discussing appropriate water allocations.



Raz, Eli The Dead Sea Book, Nature Reserve Authority, Tammar Regional Authority, Israel, 1993

C) TRANSPORTATION

C.1 Existing Conditions

International Traffic: There is very little international traffic in the JRV in general, and in the Dead Sea area in particular. The only current means of transport is by road, which is mostly restricted within national boundaries.

The main crossings in the vicinity of the Dead Sea are:

- * King Hussein / Allenby Bridge, between Amman and Jericho. This is a single lane bridge with not much traffic, though traffic levels have slightly risen and are expected to rise further, following the peace process and the opening of the borders.
- * King Abdullah Bridge between Jordan and the PNA (closed).

Presently only commercial vehicles carrying cement or fuel are allowed to cross at Allenby/King Hussein Bridge. All other commercial vehicles must be loaded back to back. Current traffic volume is therefore only 10-20 vehicles per day. But it is only a matter of time before private vehicles and all commercial vehicles are allowed to cross freely. Before 1967, approximately 5,000 vehicles a day crossed through the crossing each day. Some projections demonstrate that in the year 2010 the average daily traffic may reach 20,000 vehicles per day.

C.2 Proposed Developments

* The Central Route Corridor Expansion - Road # 90: This project envisages the development of a road from Nuweiba in Egypt to Metula in Israel on the existing road # 90, which runs from south to north, along the JRV and Dead Sea, in order to re-establish the land-link between Europe, Asia and Africa. The broader project envisions modern expressways extending approximately 1700 km from Syria's border with Turkey to the Gulf of Aqaba and to Saudi Arabia. Initial plans include widening road #90 into four lanes in order to accommodate international traffic and international trucking.

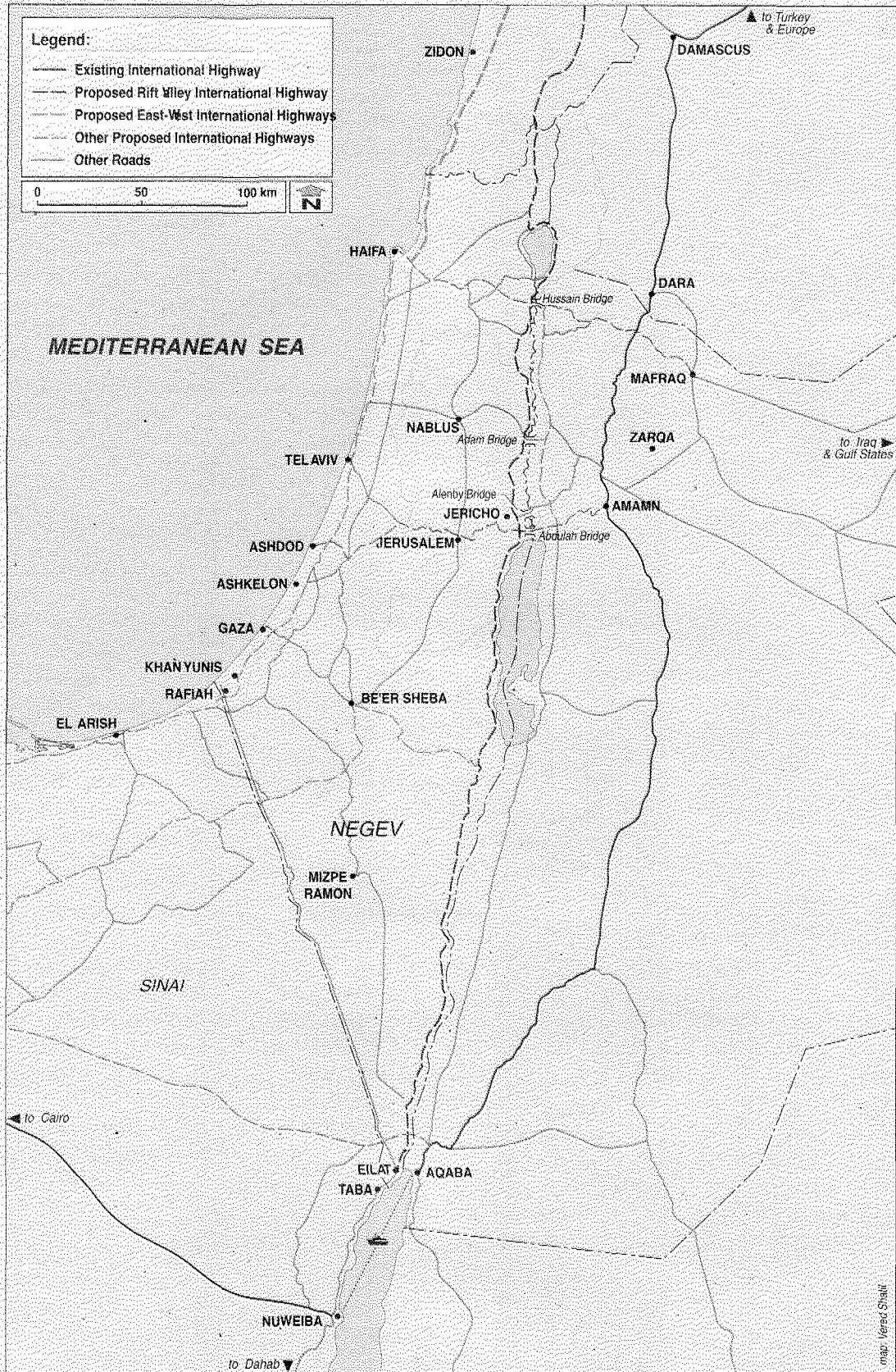
* Allenby/King Hussein and Abdullah Bridges are also planned to be widened together with their access roads into four lane highways. These bridges and roads will be the main arteries connecting traffic flowing from east to west.

C.3 Environmental Impacts

An international highway (four lanes) and a trans-continental trucking route along the western shores of the Dead Sea will have a major negative impact on the environmental integrity of the Dead Sea. The widening of road #90 will necessitate severe damage to the cliff face on the western shore at several locations. The widening of the road and the proposed heavy truck use will act as a divide between the cliffs and the sea.

Increased air emission and traffic fatalities will have a heavy toll on the fragile wildlife of the Dead Sea area, and will inevitably have a negative impact on any proposed tourist development. The building of a north south highway and the widening of the east west links just north of the Dead Sea are also likely to have a compounding impact by creating bottlenecks, traffic hazards and increasing air pollution in the northern Dead Sea area.

Transportation Routes



C.4 Recommendations

From an environmental perspective, the existing highway, east of the Dead Sea, which presently traverses through the desert plains of Jordan and is called the Desert Highway, is the most suitable road to serve as an international highway for the region. The Desert Highway is a presently existing four lane carriageway that runs through an area that is of lower environmental value than the Dead Sea area. There appears to be no need to build another highway adjoining the Dead Sea.

For road safety reasons, the existing two lane carriageways around the Dead Sea should be improved but under no circumstances should they be widened further. An emphasis should be placed on alternative means of transportation around the Dead Sea. Tourists arriving at the Dead Sea by car should be encouraged to leave their car at the hotels and use public transportation to visit the many sights around the Dead Sea. A positive development is the opening of a boating route in the Dead Sea. Preferably sailing boats could ferry tourists to the various attractions around the Dead Sea thus making available an enticing "tourist attraction". This would be the most enjoyable means of transportation for the tourist and the most environmentally friendly for the ecology of the Dead Sea.

For the time being it is important that all governments adopt international standards of vehicle emissions to help reduce vehicle pollution impacts. The phenomenon of jeeps, off-road motorbikes and dune-buggies is currently on the rise, and has already had severe impacts on the western shore. The movement of any sort of vehicles should be limited to existing roads only. On the other hand, it may be possible to designate specific areas for these off-road purposes, in areas which are ecologically relatively less sensitive, and are in close proximity to the existing development centres.

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| <ul style="list-style-type: none">* The existing Desert Highway through the plains of Jordan is the most suitable route for an international highway.* Tourists could enjoy sailboat ferry tours of the Dead Sea at lower environmental cost than private automobiles. |
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D) TOURISM

D.1 Existing Conditions

Southwest: A single cluster of hotels, planned for 4800 rooms, was initiated during the 1960's. By 1990 only 1550 rooms had been built, because of a planning problem: Since the DSW were permitted, according to their license, to maintain the level of the Dead Sea basin (which is, in fact, an artificially controlled series of salt pans) according to their industrial needs, the existing hotels faced the risk of becoming engulfed by the waterlogged zone by the year 2000. Due to this risk, plans to build more hotels on this site were abandoned in favour of another site near Massada or 'Ein Gedi.

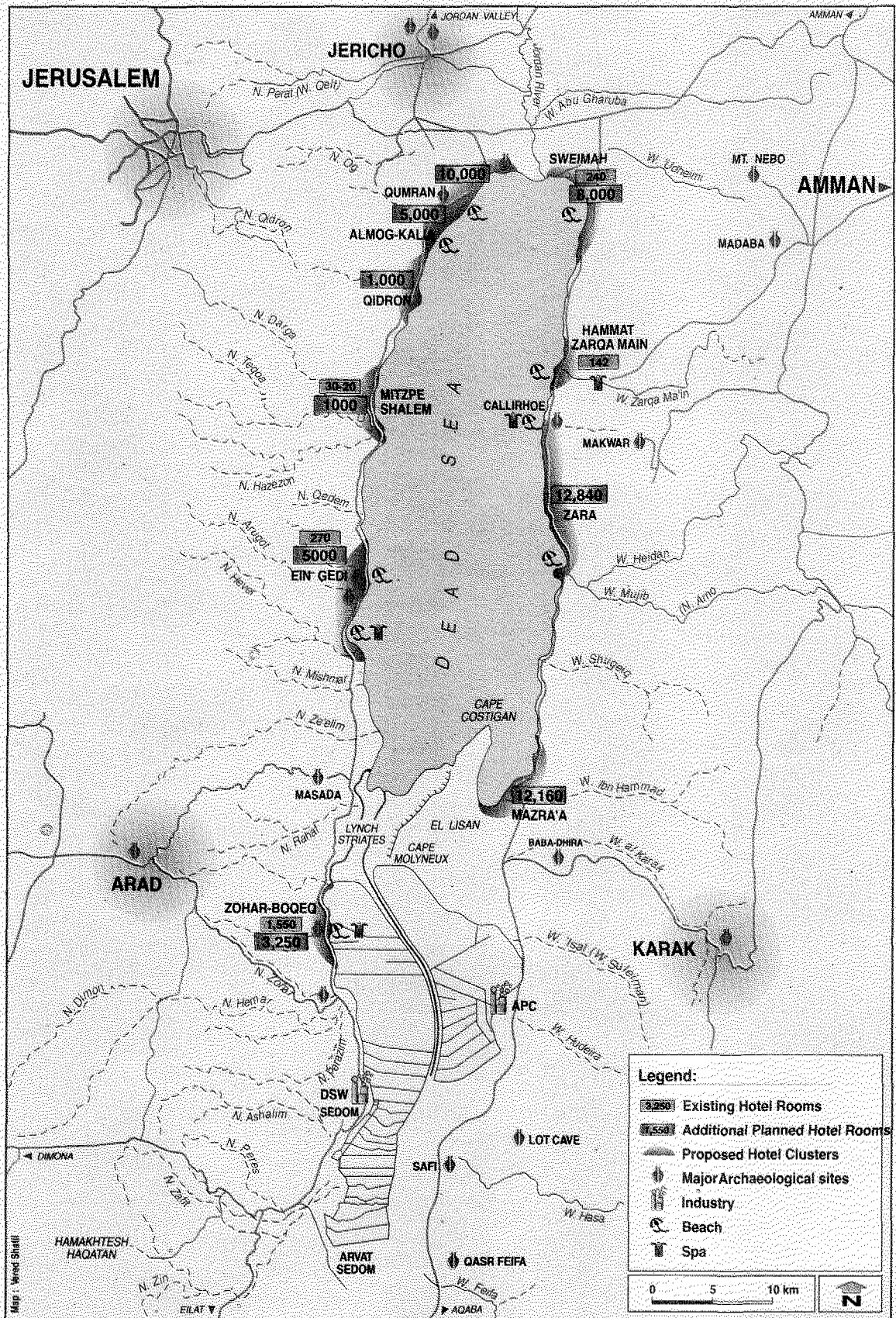
After a court order was issued to revise the DSW license, plans were made to separate the industrial salt pans from water bodies that may serve the hotel area. This development rekindled interest in completing the southern hotel cluster to its full capacity.

Centre west: Originally an area was set aside for hotel building near Massada, mainly as an alternative to the expansion of the southern site. These plans, however, encountered great public protest. As a result, another hotel site was proposed near 'Ein Gedi. Currently there exists at 'Ein Gedi a small human settlement (Kibbutz 'Ein Gedi and the 'Ein Gedi field school), and a beach area with some restaurants and shops. At Massada there is a small youth hostel and some other basic tourist facilities.

Current occupancy rates of the western shore hotels is about 70%.

Northeast: One hotel operates in the north-eastern area, and three within the ravine of Wadi Zarqa Ma'in (at Hamamat Ma'in), where other facilities are also available around the hot springs.

Proposed Tourism Development



D.2 Proposed Developments

Northwest: The PNA has plans to build some forty hotels with a sum capacity of 10,000 rooms, which will occupy approximately 8 km of beach. A water park is also planned, with facilities and about 350 rooms. In the same area Israel has plans to build a hotel cluster which would accommodate 5,000 hotel rooms.

West: Existing plans at 'Ein Gedi speak of 4,500 new hotel rooms, totalling 5,200 by the year 2000. By the year 2005 a total of 6,900 rooms are envisaged.

In addition, hotels and detached vacation lodgers are proposed to be built on the gravel fans of large gorges such as the Kidron and Dragot creeks. The existing desert tourist centre, Metsokei Dragot, also has plans for further expansion.

East: A Master Plan exists for development along 60 km of the eastern shore, mainly in three areas: Suweimah - north (of highest priority)

Zara - central corridor

El Mazra'a - central corridor

These plans include a total of approximately 33,000 bed units.

"The Lowest Park on Earth": This is designed to be a borderless park, surrounding the Dead Sea. A visit to the park is intended to highlight the area's special qualities: its geography, geology, history, etc. There will be special trails, and each will tell some kind of story, or convey a message.

Hotel Rooms Around the Dead Sea Shores:

Area	Existing	Planned	Total
<i>North</i> (Kalia, Almog, Sweimah)		PNA : 10,000 Israel : 5,000 Jordan: 8,000	13,000-18,000
<i>Central Corridors</i> Metzokei Dragot, Ein Gedi, Zara HammatZarqa-Ma'in, Mazra'a)	400	32,000	32,400
<i>South</i> (Ein Boqeq)	1,550	3,650	5,200
Total			50,600-55,600

D.3 Environmental Impacts

The proposed tourist development along the central corridors of the Dead Sea, on both the eastern and western shores, poses a severe threat to the natural and environmental integrity of the Dead Sea. These corridors are where the cliffs meet the sea. Like the proposed international highway, linear building of hotels along the corridor will destroy the barrenness for which the Dead Sea is famous.

For all practical purposes, the northern and southern shores of the Dead Sea are better suited for tourist development. The northern shore in particular constitutes large, flat, open spaces, with room for substantial hotel development yet sufficiently distant from the sensitive cliffs found on the East and West corridors, so to minimise the impact on the cultural resources and biodiversity of the region. At the northern shore there is also relatively plentiful fresh Dead Sea water and it is the nearest point to Jerusalem, Jericho and Amman, which is convenient for both tourists and tourist service providers.

Proximity to existing urban centres is a significant consideration as according to tourist industry publications, 1 to 2 persons need to be employed per hotel room in order to provide services to hotel guests. If large scale hotel development was to be permitted along the western or eastern corridors then total development would most likely be doubled as housing facilities would also need to be built to accommodate hotel staff. An urban development along the shores of the Dead Sea could be avoided if development is concentrated at the northern and southern shores, where in the north the existing urban areas of Jerusalem, Jericho and Amman could be utilised and in the south the existing towns of Arad and Karak would provide the personnel. This is indeed the current situation for the existing hotel cluster at Ein Boqueq on the south western shore where hotel staff commute from the existing town of Arad.

Large scale development along the eastern or western corridors also poses serious problems in relation to sewage and solid waste disposal. There is insufficient land space for sanitary landfills or sewage treatment facilities on the eastern or western corridors. Waste might therefore be improperly dumped near the hotel clusters or would have to be transported out of the corridor areas towards the northern or southern open plains. Transporting the waste out of the corridor region would also negatively impact the area. It would require the building of pipes along the shore or cliffs, impacting the scenery and creating the opportunity for leaks and burst pipes. Additionally the trucking of solid wastes would be required, increasing congestion and air pollution on the roads. All of these negative environmental impacts could be either avoided or mitigated if development was to be concentrated on the northern and southern regions of the Dead Sea.

D.4 Recommendations

There is an urgent need to devise a master plan for tourist development around the Dead Sea, which plans for development as a single ecosystem and not fragmented by political borders. Tourist development should take place in a few, defined locations on the northern and southern shores of the Dead Sea, leaving between them, wide, undisturbed open spaces on the eastern and western corridors. It is best to develop areas which are already “disturbed,” such as Suweimeh on the north-eastern shore, and the area between Qumran, Jericho junction and Dover plain on the north-western shore.

On the western shore it appears that developers are aware that the north/western shore is a better location for development, but since the north western shore is part of the Palestinian West Bank there is a reluctance on their part to invest there. These political considerations appear to be the main impetus behind development planned in the Ein Gedi region. If development was to be minimised at Ein Gedi then there could be strong pressures placed on Jordan as well to minimise development on its eastern corridor of the Dead Sea.

The challenge therefore is how to turn these political considerations around so that they are in line with environmental considerations. Instead of seeing the political boundaries as obstacles to development, they need to be seen as opportunities for development. A possible task for the Dead Sea Committee could be to foster the declaration of a defined area of the northern shore, as a shared tourist development site, STDS. If an STDS could guarantee security of investment, irrespective of whether they were Palestinian, Israeli, Jordanian or foreign investors and even provide tax incentives for joint Palestinian, Israeli and Jordanian development, then the northern shore could well serve as a model for peace and cooperation as well as for sustainable development.

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| <ul style="list-style-type: none">* Tourist developments should take place in a few, defined locations on the northern and southern shores, not exploiting the land on the eastern and western shores.* The challenge is to turn political boundaries into opportunities for development rather than obstacles to development, in line with environmental considerations. |
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4. Conclusions and Recommendations

Present proposals reflect a severe lack of integrated strategic planning for the Dead Sea area. All parties seek to maximise individual gains in each development sector, while ignoring development plans of riparian partners. It is pertinently clear that severe conflicting interests between industry, tourism, agriculture and international trucking interests exist in the developments as currently proposed for the Dead Sea. These conflicting interests have not been assessed or mitigated and if development continues to proceed in this ad hoc manner then the development around the Dead Sea will fail to satisfy the interests of any of the stake-holders. Boundary/political considerations are also currently having a major negative impact on the possibility for sustainable development.

What is required is a detailed environmental and economic study, to assess priorities for Dead Sea development. Coordination and cooperation between the various planners on all shores of the Dead Sea are required in order to prioritise and correctly plan development. Without coordination one party could decide to promote tourism, while the other decides to further extract water for agricultural usage, an activity that might hamper the first party's development of their tourist industry.

A structure for permanent cooperation, specifically for the needs of the Dead Sea, through institution building, such as the creation of an International Joint Commission for the Dead Sea, is required. A commission is required in order to oversee and implement an integrated developmental program for the area. Similar Commissions exist for other shared ecosystems around the world and they can be used as a model for the creation of a Dead Sea Joint Commission. A first task of such Joint Commission would be to seek the listing of the Dead Sea area on UNESCO's World Heritage Convention. This symbolic act would help raise awareness both regionally and internationally of the uniqueness of the Dead Sea and its importance for Global Heritage.

The creation, by EcoPeace, of a Dead Sea Committee, would be an appropriate first step to bring together the diverse interests who seek to develop the Dead Sea area. This would advance the interests of the Dead Sea as a whole and be a means to encourage governments to act without haste in order to protect the Dead Sea. The role of the Dead Sea Committee would therefore be to foster and further support for the following actions:

- a) Creating the Dead Sea International Joint Commission, as an independent intergovernmental body with appropriate powers to ensure that the Dead Sea is developed in a sustainable fashion.
- b) Listing the Dead Sea as a World Heritage Site according to UNESCO's World Heritage Convention.
- c) Developing a Master Plan for tourism around the Dead Sea, that would concentrate development on the northern and southern shores, and as much as possible leave the central corridors free of development.

Conclusions and Recommendations

- d) Conducting a full archaeological and biodiversity study around all the shores of the Dead Sea.
- e) Developing a Master Plan specific to water utilisation for the Jordan River Basin, in order to reach a sustainable water allocation plan that will satisfy the various interests at stake, while safeguarding the integrity of the Dead Sea and guaranteeing its survival.
- f) Maintaining the Desert Highway as the international road and trucking route for the region and seeking to prevent the development of another major international road along the western or eastern shores of the Dead Sea.
- g) Supporting a sustainable transportation system for the tourist route around the Dead Sea with preference given to Sail Boats
- h) Ceasing all ozone depleting bromide production around the Dead Sea as soon as possible and no later than the year 2001.
- i) Conducting an independent environmental audit of the impact of the potash companies on the environment around the Dead Sea.

5. Response Form

EcoPeace invites all interested persons to express their support for the goals of the Dead Sea Committee by completing the details listed in the attached form and forwarding it to us. Persons interested in being members of the Dead Sea Committee should mark the appropriate box. From all the applicants received EcoPeace will then select appropriately qualified persons, representing the various interests at stake to be members of the Committee.

NAME:

ORGANISATION:

ADDRESS:

RELEVANT PROFESSIONAL CAPACITY:

OTHER COMMENTS:

TEL:

FAX:

E-MAIL:

I would like to be a member of the Dead Sea Committee.

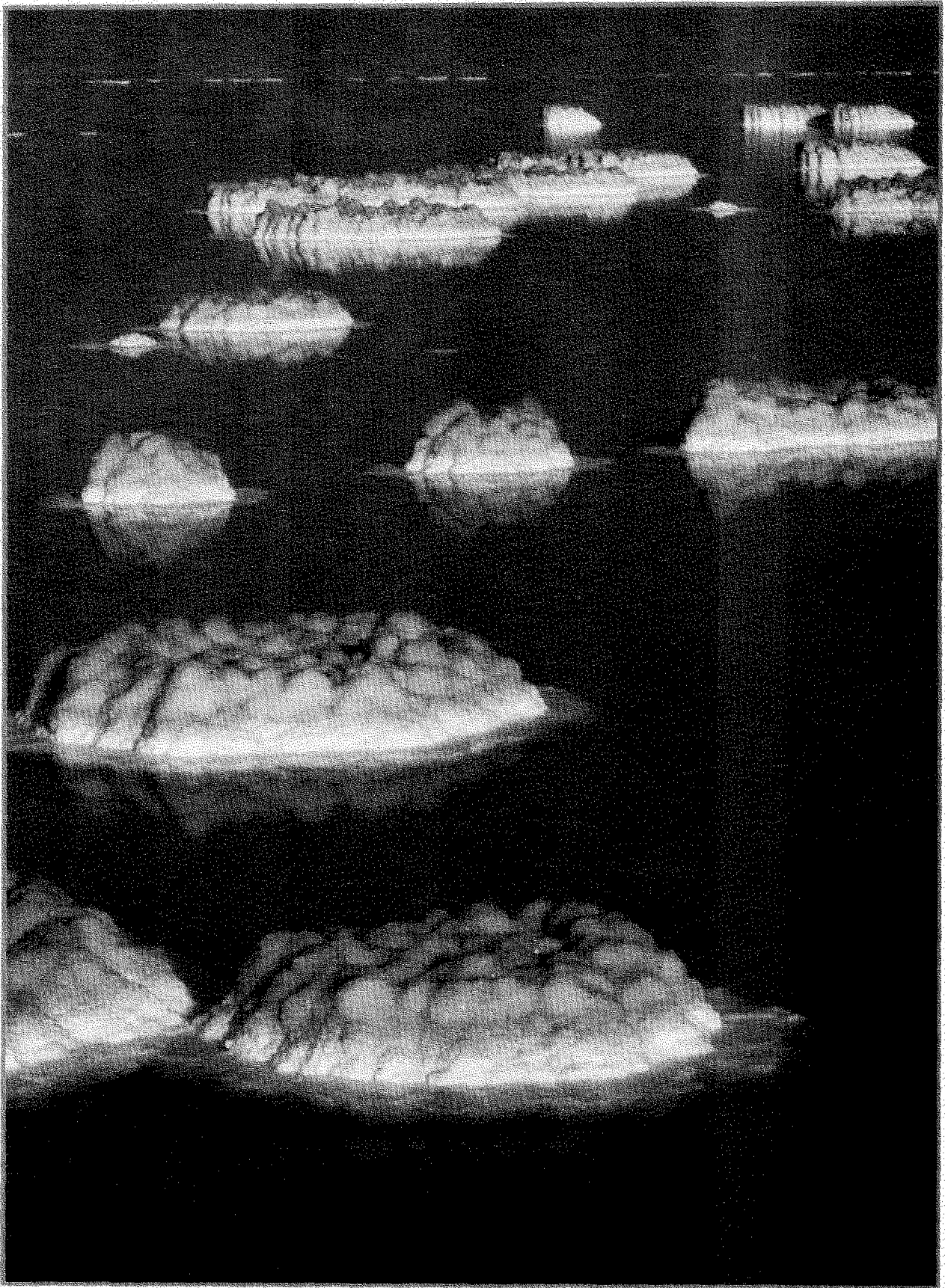
YES

I would like to express my support for the objectives of the Dead Sea Committee.

YES

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