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Misrepresenting the Jordan River Basin

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ABSTRACT: This article advances a critique of the UN Economic and Social Commission for West Asia's (ESCWA's) representation of the Jordan River Basin, as contained in its recently published *Inventory of Shared Water Resources in Western Asia*. We argue that ESCWA's representation of the Jordan Basin is marked by serious technical errors and a systematic bias in favour of one riparian, Israel, and against the Jordan River's four Arab riparians. We demonstrate this in relation to ESCWA's account of the political geography of the Jordan River Basin, which foregrounds Israel and its perspectives and narratives; in relation to hydrology, where Israel's contribution to the basin is overstated, whilst that of Arab riparians is understated; and in relation to development and abstraction, where Israel's transformation and use of the basin are underplayed, while Arab impacts are exaggerated. Taken together, this bundle of misrepresentations conveys the impression that it is Israel which is the main contributor to the Jordan River Basin, Arab riparians its chief exploiters. This impression is, we argue, not just false but also surprising, given that the *Inventory* is in the name of an organisation of Arab states. The evidence discussed here provides a striking illustration of how hegemonic hydro-political narratives are reproduced, including by actors other than basin hegemons themselves.

KEYWORDS: Jordan River, hydrology, bias, political geography, hegemony

INTRODUCTION

In 2013, the UN Social and Economic Commission for West Asia (ESCWA), together with the German Federal Institute for Geosciences and Natural Resources (Bundesanstalt für Geowissenschaften und Rohstoffe, or BGR), published a 600-page *Inventory of Shared Water Resources in Western Asia*, constituting "the first UN-led effort to make a comprehensive assessment of the state of transboundary surface and groundwater resources in the Middle East" (ESCWA-BGR, 2013: viii; subsequent references to this report give page numbers only).¹ The *Inventory* provides detailed geographical, hydrological and water use and cooperation information on seven shared river basins and 22 shared groundwater systems in West Asia, ranging from the widely studied Euphrates, Tigris and Jordan rivers, through to the much lesser known non-renewable aquifers of the Arabian peninsula. The culmination of five years of work – which included input from 14 lead and contributing authors, numerous regional and international experts and reviewers, and official representatives from all 14 ESCWA members (5-8, xi) – the *Inventory* could become the standard reference work on the region's waters for years to come.

For the most part, the *Inventory* is an impressive work of synthesis, which achieves its aim of providing "a sound scientific basis for informing discussions and fostering dialogue" on West Asian

¹ It should be noted that one of us, C. Messerschmid, was the main contributing author to chapters 19 (Western Aquifer Basin) and 20 (Coastal Aquifer Basin) of the *Inventory* (xi).

water resources (4). Its chapters on hitherto under-reported basins are especially valuable, and its consideration not only of hydrology, but also of water use and development, and transboundary cooperation, is also welcome. Some important findings emerge, including evidence of significant 'under the radar' practical cooperation between riparians, even over groundwater – something that is often ignored within an international policy discourse that swings between false warnings of water wars and equally misleading models of harmonious cooperation (see e.g. Zeitoun and Mirumachi, 2008). In these respects, the *Inventory* is a valuable addition to the literature.

The same is not true, however, of its 53-page chapter on the Jordan River which, despite being the report's longest by far, dealing with the most heavily researched watercourse in the region, is marked by serious technical errors and by a systematic bias in favour of one riparian, Israel, and against the Jordan River's four Arab riparians. The Palestinian Authority and various Palestinian water experts have protested to ESCWA about the contents of the chapter (Attili, 2013; Palestinian water experts, 2013), the latter denouncing it as 'Zionist propaganda' and demanding its retraction. In an apparent response, ESCWA-BGR first withdrew the chapter from its website before reposting it unchanged together with a Corrigendum (ESCWA-BGR, 2014), almost half of which is devoted to errors in the Jordan Basin chapter. Despite this, the Corrigendum touches on only a small portion of the chapter's shortcomings, whilst simultaneously introducing some new errors.² As yet, the chapter's shortcomings have not been fully detailed or addressed, let alone corrected.

Our aim in this article is to document and draw attention to the most politically important of these shortcomings. Our main contention is that while ESCWA-BGR claim the *Inventory* to be "the outcome of an unbiased scientific process" (5), in reality its Jordan River chapter displays a systematic pro-Israeli and anti-Arab bias. We demonstrate this in relation to ESCWA-BGR's accounts of the political geography of the basin (section 2 below); in relation to its account of basin hydrology (section 3); and in relation to its account of water development and use (section 4). In the main body of the article, we do not speculate on the roots of this bias, our objective being instead simply to describe the chapter's questionable hydro-politics. It is only in conclusion that we venture into more interpretive territory, reflecting on what might explain how such a biased piece of work could have been produced in the name of ESCWA, an organisation of Arab-majority states, and without any Israeli input. There, we also argue that the chapter will need to be revised if, as ESCWA-BGR hope, it is to provide "a sound scientific basis" for the management, use and just reallocation of Jordan Basin's water resources.

The evidence marshalled in this article provides a revealing illustration of how hegemonic hydro-political narratives get reproduced; and to this extent the article can be read as a case study in the relations between knowledge production and power, and in the ideational dimensions of hydro-hegemony (Zeitoun, 2008: 111-23). More specifically, the article makes two thematic contributions. It illustrates, firstly, that hegemonic narratives are not only told by basin hegemons, but are reproduced and reinforced by a wide range of actors, including in some cases by actors – in this case ESCWA – whom one might expect to narrate things very differently. And it illustrates, secondly, the range of representational practices through which hegemonic narratives are reproduced and sustained, of which we identify at least nine types of practice or technique: (i) the *misrepresentation* of primary sources and realities; (ii) the *omission* of evidence contradicting the hegemonic narrative in question; (iii) the attribution of *uncertainty* to facts that are contrary to hegemonic narratives, on issues over which there is actually much greater certainty than is suggested; (iv) the use of *inappropriate methods* of description and analysis; (v) *inconsistency* in the application of data analysis methods, where methods and standards are applied differentially to different riparians; (vi) the use of particular *words and*

² For reasons of space, we do not discuss the Corrigendum's shortcomings here. A full analysis of the Corrigendum is available from the first author on request. In our analysis below, we note in footnotes where a specific problem in the chapter is addressed and satisfactorily resolved in the Corrigendum.

images that reflect and create impressions in line with hegemonic narratives; (vii) *explicit evaluations*, including praise for and valorisation of the hegemon, and criticism of other riparians; (viii) a *disproportionate focus* on the hegemon; and (ix) *de-politicisation*, where political factors and issues are ignored or addressed only superficially, and where the impacts of power inequalities are consequently underplayed. Examples of all nine of these representational – or rather misrepresentational – practices can be found in ESCWA-BGR's account of the Jordan River Basin, as we demonstrate below.

Politics aside, the chapter is also marked by various technical weaknesses. The chapter's referencing, for instance, is often poor. Some of the references are wrong: for example, HSI (Hydrological Service of Israel), 1944-2008 (181-5, 191) cannot be correct given that the State of Israel wasn't established until 1948, and given that the annual reports on 'development and utilization' being referred to only began in 1993.³ Others are inappropriate: the Ministry of Water Resources in Iraq, 2012 (198) is surely not an appropriate source of data on Israel's water diversions into its National Water Carrier.⁴ And some other references are so vague as to render it impossible to identify sources or corroborate the claims made: much of the chapter's hydrological data, for instance, is simply referenced as "compiled by ESCWA-BGR based on data published by HSI, 1944-2008" (181-5, 191) or "HSI, 1979-99" (189), without any specific volumes, let alone page numbers being indicated. The chapter, in short, is not only politically problematic, but also technically flawed. If the chapter is to be revised this will need to be with an eye to both its technical and political shortcomings. Our focus in this article, however, is on its systematic biases; while we do enter into some quite technical territory, this is only in so far as this technical detail is of political significance.

POLITICAL GEOGRAPHY

Three aspects of the chapter's representation of the political geography of the Jordan Basin deserve particular mention. First, we find a striking textual and graphical bias to the chapter, which privileges and valorises a distinctively Zionist 'imaginative geography' (Said, 1991: 7; Gregory, 1995). Hebrew place names are often inappropriately used rather than their English or original Arabic equivalents: Jabal Ash-Shaykh is always referred to by its Hebrew name 'Mount Hermon' (170, 173, 177-9, 181-3), despite its location on the Syrian-Lebanese border; the confluence with the Yarmouk is labelled 'Naarayim' (189: which is in any case wrong – the actual Zionist Hebrew term is 'Naharayim'), rather than by its traditional Arabic name Al-Baqura; the Liddan springs are referred to throughout as 'Dan River' (177); and neither the remaining Palestinian town of 'Jaffa' nor the official Israeli term 'Tel Aviv-Jaffa' are recognised – instead the chapter refers to 'Tel Aviv-Yafo', a designation more Zionist than that used by the Israeli government (173).

The chapter's 21 photographs project a similarly skewed picture of the basin. Images of Israel and Jordan predominate, whilst Lebanon and especially Syria and the occupied Palestinian territories (oPt) are hidden from view. Syria is only named in relation to one image (183), despite accounting for 37% of the Jordan Basin's area and the large majority of flow contributions; while not a single image refers to Palestine, or the West Bank, or oPt (actually, one photo shows illegal settler farms in the West Bank, but is entitled 'Israel': 199). Instead, Israel and its traditional ally across the Jordan (Shlaim, 1988) are pictorially represented as the basin's core riparians.

³ The Corrigendum does not correct but only deepens this flaw. It notes as follows: "Page 181, onwards, the source for table 2 and figures 6-8 should read: 'Source: Compiled by ESCWA BGR based on data published by Palestine Irrigation Service, 1944-1946 and HSI, 1946-2008'" (bold emphasis in ESCWA-BGR, 2014). The mistakes here are twofold. Instead of referencing 'HSI 1944' – four years before the establishment of Israel – ESCWA-BGR now reference 'HSI 1946' – two years before. And second, the Corrigendum now invokes an invented source, the 'Palestine Irrigation Service': there never was such a publisher, and there never existed any such report for this period.

⁴ This particular reference is corrected in the Corrigendum.

Second, the chapter consistently misrepresents or obscures the legal and political status of certain territories and populations. The Golan's occupied status is noted and discussed within the text (e.g. 177, 179, 194). But these references are only partially correct – since the Golan has not only been occupied but also *annexed* by Israel. Moreover, elsewhere in the chapter the Golan is referred to as an 'Israeli district' (179). And the several photos depicting the Golan never refer to 'Syria' in the title line (179, 183, 185, 188), most importantly that of the Baniyas Spring at the head of the Jordan River (183) – as if the Golan were a legally disputed territory, rather than one that has been illegally occupied and annexed by Israel. Similarly, Israel's military occupation of the West Bank receives scant mention within ESCWA-BGR's depiction of the Jordan Basin. The word 'occupied' occurs not once in the body of the chapter in relation to Palestine, while there are only two references to the 'occupation' of Palestine. Israeli 'settlers' and 'settlements' in the West Bank are not mentioned at all within the chapter's main text, and where they are briefly referred to in a text box this is as 'Israelis living in the West Bank' who are apparently considered equivalent to 'Syrians living in the occupied Golan' (179, reproduced as Figure 1 below), rather than a population whose transfer into occupied territories is illegal under international law. Nowhere in the chapter, either, is there mention of Israeli settlers in the Golan Heights. In sum, the chapter largely neglects the central facts of the political geography of West Bank – namely Israel's occupation and state-led settlement project – whilst being less than accurate or consistent on the legal status of the Golan. These geographical misrepresentations are directly linked to and paralleled by the hydrological misrepresentations detailed below.

Figure 1. ESCWA-BGR's misleading juxtaposition of Israeli settlers in the West Bank, and Syrians in the Golan. Source: ESCWA-BGR, 2013: 179.



Third, much of the population data used in the chapter is questionable, almost certainly understating the Palestinian, Lebanese and Syrian populations of the basin, as well as illegal settler numbers. This is important not just as a matter of accuracy, but also because population share is one of the key factors in international water law for determining 'reasonable and equitable shares' to transboundary water resources. Take the chapter's data for the West Bank as an example. The Palestinian population of the basin is put at 431,000 (179; figure for 2012), despite parts of the major towns of Nablus and Ramallah, and the north-eastern outskirts of Jerusalem, lying within it; these cities alone have a population of over 546,000 (calculated from City Population, n.d.). In turn, the chapter claims that Palestinians account for only 6% of the total Jordan Basin population – a very minor, almost irrelevant proportion. The chapter also implies that only a tenth of the population of the West Bank resides within the basin, while in reality almost half of the West Bank area and of its major cities does so.⁵ Israeli settler numbers are also understated at 30,000 (179) when statistics suggest a total settler population within the basin

⁵ This implication arises because Table 1 on p. 179 puts the total population of 'Palestine (West Bank)' at 4.1 million, rather than noting that this is the total 2012 population of Palestine, including the Gaza Strip. The official Palestinian estimate for the West Bank in 2012 lies at 2.65 million (PCBS, n.d.) only. This mistake is corrected in the Corrigendum.

of over 95,000 (calculated from FMEP, n.d.; calculations available on request).⁶ Meanwhile, no figure is even given for the settler population of the Golan: are ESCWA and BGR assuming, or even implying, that these illegal settlers are rightful and lawful inhabitants of an Israeli territory? As above, we find that Israel's illegal settlement project is variously minimised or ignored.

HYDROLOGY

The chapter's account of the Jordan Basin's hydrology is similarly flawed, in two main ways. First, its overall representation of the Jordan Basin as comprising a series of distinct and separate sub-basins is out of line with global hydrological norms, and instead aligned with long-standing Israeli claims and interests. These problems are reflected in the structure of the chapter, and in its graphics and text. Thus the 'Headwaters of the Upper Jordan River', the 'Upper Jordan River', the 'Yarmouk River' and the 'Lower Jordan River' are all identified as distinct watercourses, and are discussed in turn (180-91). The chapter also claims that north of Lake Tiberias, the river is "generally designated" the 'Upper Jordan River', while to its south it is referred to as the 'Lower Jordan River' (177) – as if this were standard and uncontroversial terminology.

But this is not so. The standard way of representing the basin would be to treat it as a single and indivisible hydrological unit, comprising 'upstream' and 'downstream', or 'northern' and 'southern', or 'upper' and 'lower' 'sections' or 'portions' (without capitalisation). This is not a trivial or merely orthographical point. No other chapter in the *Inventory* discusses different river sections in turn, or capitalises and nominalises them as discrete watercourses. This reflects the fact that the principle of basin unity is one of the cornerstones of hydrological science, as well as of water planning, management and international water law. The UN Watercourses Convention, for instance, is organised around the principle that a 'watercourse' (i.e. basin) is a 'unitary whole' characterised by "a system of surface waters and groundwaters (...) and normally flowing towards a common terminus" (UNGA, 1997: Article 2, a); while the World Bank advocates "river basins as the appropriate unit for analysis and coordinated management" (World Bank, 1993: 14, 71; see also Molle, 2009).

Indeed, ESCWA-BGR's portrayal of the Jordan Basin as comprising separate sub-units reflects not standard international scientific, management or legal practice but rather specifically Israeli narratives and interests. The Jordan Basin is regularly subdivided by Israeli experts and institutions, and in Israeli-led plans: for example, a recent semi-official Israeli report depicts the 'Kinneret Basin' (i.e. Lake Tiberias and the Jordan River to its north) as "a separate basin" disconnected from the lower Jordan, and even goes so far as to claim that the upper catchment of the Jordan River has its "final discharge into Lake Kinneret" (Weinberger et al., 2012: 4, 15), where it should be clear that the discharge point is the Dead Sea. Similarly, the Geneva Accord proposal for an Israeli-Palestinian water agreement, drafted by Israeli water expert Hillel Shuval, proposes a system of Israeli-Palestinian water management which would cover the 'Lower Jordan River' only, instead of the Jordan River as a whole (Geneva Initiative, 2009). Such representations reflect Israel's long-standing hydro-strategic interest in maintaining exclusive control over the Jordan headwaters and Lake Tiberias. ESCWA-BGR's sub-division of the Jordan Basin, in sum, is simultaneously technically misleading, out of line with international management and legal principles, and instead in line with Israel's politicised narratives and interests in maintaining hegemony, control and near-exclusive use of the Jordan River. Applying this division and making Palestinians riparians of the 'Lower Jordan River' only would leave them high and dry, at best receiving a share of the 20 Mm³/yr available there.

⁶ The Corrigendum removes the claimed "30,000 Israeli settlers" from the Palestinian population of the basin, without adding any figure in its place: in the Corrigendum, Israeli settlers just disappear.

Secondly, through a mixture of omission, impression, and flawed methodology, the *Inventory* manages to exaggerate Israel's contributions to the Jordan River whilst understating those of its Arab riparians. The major omission is that the chapter does not provide any data on the relative contributions of the basin's five riparians – in breach of the *Inventory's* stated methodology (40), and despite the chapter's promise to provide this information (180). The chapter thus provides the reader with no basis for knowing whether Israel is a major or – as it actually is – a relatively minor contributor to basin flows. One would not know from the chapter, for instance, that under natural flow conditions more water evaporates from Lake Huleh and Lake Tiberias than is contributed to the upper Jordan River by surface water and groundwater flows originating from Israeli territory, or in other words, that Israel's net contribution to the northern basin is negative, as shown in Figure 3 (calculations are shown in the Annex). This lacuna is particularly significant because much of the chapter conveys the exact opposite impression: its photographs, for example, depict the 'Dan River' within Israel in full flow (181), but the Hasbani in Lebanon as a trickle (194), whilst the only Syrian-titled image presents a pitiful sight (211; these three images are reproduced as Figure 2 below). The actually Syrian Baniyas springs are depicted, but named only as part of the Golan, not as within Syria (183).

Figure 2. ESCWA-BGR's depictions of Jordan River tributaries in Israel, Lebanon and Syria.



Anti-clockwise, top left to bottom right:

The Dan River, Israel, 2008. Source: Nethanel H.

The Hasbani River, Lebanon, 2003. Source: Ralf Klingbeil

Wadi Shihab, a tributary of the Yarmouk River in Dera'a Governorate, Syria, 2009. Source: Adel Samara.

and Palestine ... doesn't exist

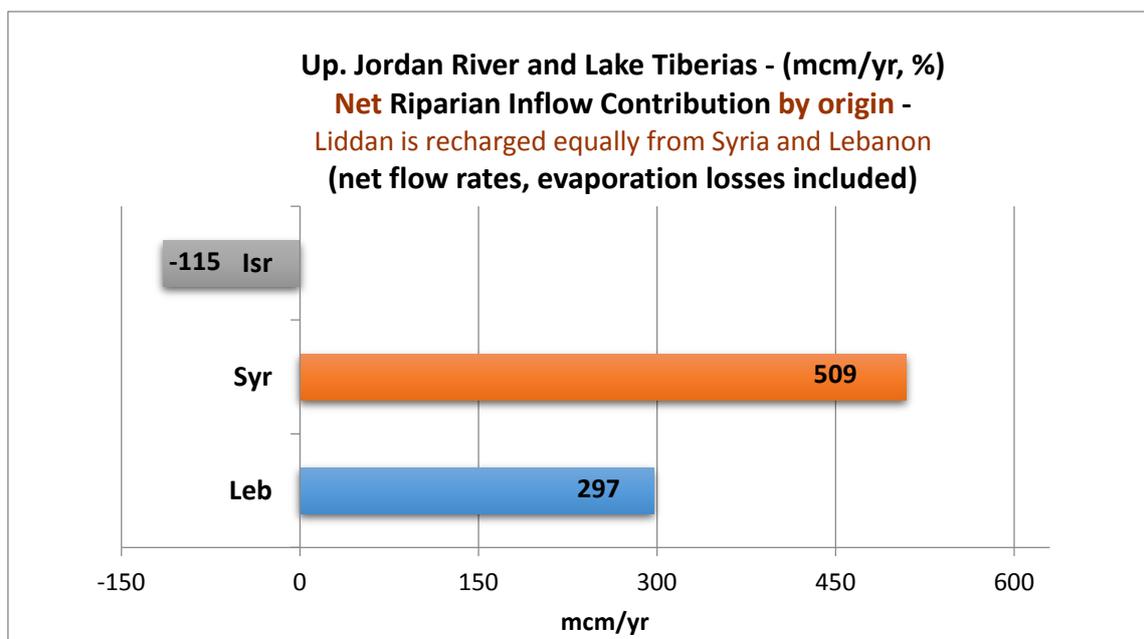


Source: ESCWA-BGR 2013: 181, 194, 211.

The major problem here, though, lies with the chapter's approach to analysing groundwater-surface water interactions, which is both scientifically inconsistent and inappropriate, and has the effect of understating Syrian, Lebanese and also Palestinian flow contributions to the basin. The *Inventory* purports to follow Oregon State University's Transboundary Freshwater Dispute Database in defining a 'river basin' as the area which contributes hydrologically, whether through surface water or groundwater, to a first order stream (35; Wolf et al., 1999). If the chapter had, in fact, followed this conventional understanding of a basin it would have noted that the Jordan Basin's headwaters are

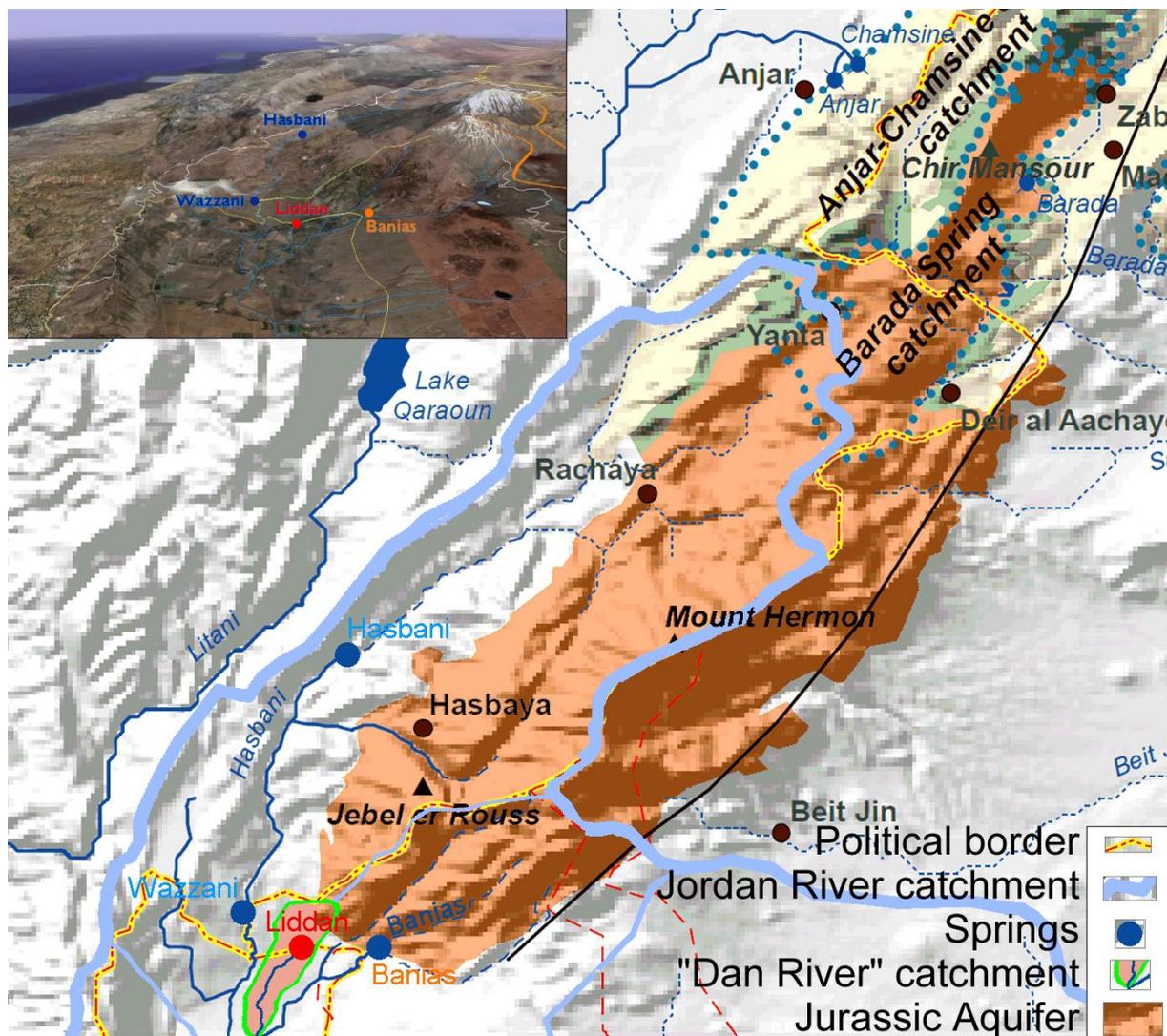
almost entirely fed by groundwater from outside the surface catchments, most importantly through the Liddan and Baniyas Springs, and the Hasbani and Wazzani Springs on the Hasbani River. The chapter may also have noted that not even the Liddan Springs – which lie within 1949 Israel by a matter of just 10-15 metres (Soffer, 1999: 123) – are recharged within Israel itself, as is well established in the scientific literature (Rimmer, 2006: 33, Fig. 2; Brielmann, 2008: 52, 53). It may instead have noted that the major springs feeding the upper Jordan all draw 100% of their flow from Lebanon and Syria, where they are recharged over the vast Jurassic and Cenomanian-Turonian outcrops of the Lebanese and Syrian Anti-Lebanon mountain range and its foothills, as is shown in another chapter of the *Inventory* (439). The Liddan specifically is fed from a large deeply buried regional Jurassic aquifer, the catchment area of which extends to a distance of over 30 km north of Damascus, as shown in Figure 4 (439). The chapter may also have observed that groundwater flows from various West Bank aquifers, including the North-Eastern Aquifer Basin and the Eastern Aquifer Basin, naturally contribute over 300 Mm³/yr to the lower Jordan River (Israel and the PLO, 1995: Annex III, Appendix 1, Schedule 10) – a not significant volume that exceeds many of the flow volumes mentioned in the chapter.

Figure 3. Net flow contributions to the upper Jordan River, by riparian contribution. The breakdown of the exact flow elements, plus sources, is shown in the Annex.



But the chapter does none of these things, instead diverging from convention in several important ways. It delineates the boundaries of the Jordan Basin on the basis of surface flows alone (173). It does not provide a single map of the basin’s groundwater catchment areas, or any data on groundwater as against surface flow contributions (and nor do ESCWA-BGR provide a parallel groundwater chapter, as they do in the case of the Yarmouk groundwater chapters and of other rivers in the *Inventory*). It refers throughout to the Hasbani, Baniyas and Dan (Liddan) as 'rivers' (181-4) – even though only the Hasbani is clearly a river of any regional (not purely local) dimension and length, flowing all year round, rather than a wadi. It identifies these tributary 'rivers' as each having "surface catchment areas" and "surface drainage areas" (181) – even though surface flows make a negligible contribution to each of these 'river's' flows, and in the case of the Liddan springs make no contribution whatsoever (no such flows are measured and recorded in the literature).

Figure 4. Groundwater and surface catchments of the source springs, in particular, the miniscule 'Dan River' surface catchment (in green).



Source: modified after ESCWA-BGR, 2013: 439.

Moreover, the chapter grants a prominent position to data on the 'specific discharge' of the Jordan River's sources – that is, data on their flow rate, divided by their surface drainage area – despite this method being wholly inappropriate for groundwater-fed streams. Using this method, ESCWA-BGR find that the 'Dan River' has a specific discharge of 12,955 mm/yr (411 l/s/km² – see Table 2, 181), whereas the Yarmouk has a specific discharge of as low as 17 mm/yr (0.55 l/s/ km² – see Table 4, 187) – 750 times lower.⁷ ESCWA-BGR do acknowledge that their finding for the 'Dan River' cannot be accounted for by its small surface catchment area (184), since recorded annual average rainfall in the Liddan springs area is around 260 Mm³/yr (HSI 2008b 300; IWA-HSI 2010: 39ff) rather than the +13,000 mm/yr

⁷ ESCWA-BGR and the 'specific discharge' method actually use the unit litres per second per km² (l/s/km²). Here we use mm/yr instead, so that ESCWA-BGR's findings can be more readily compared with actual rainfall levels.

implied by ESCWA-BGR's figures.⁸ But to address this anomaly and obtain "more realistic estimates", ESCWA-BGR propose that the effective rainfall recharge figures for all three Jordan River headwaters could just be combined (184) – a nonsensical suggestion which involves nothing more scientific than the averaging of discharge figures for falsely distributed distinct surface catchments in order to concoct an acceptable figure. The problem here is ESCWA-BGR's untenable assumption that the groundwater recharge areas of the Jordan River source springs are wholly internal to its headwaters' surface water catchments.

When the chapter does turn to groundwater, it both equivocates needlessly and makes a series of incorrect and inconsistent claims regarding the origins of the Jordan headwaters. The chapter acknowledges that the "discharge of all three headwaters originates primarily from strong karstic groundwater springs" (182). But this is as certain as the chapter gets. Instead we are told that it is only "*likely*" that the underground sources of the Liddan extend "beyond the limits of the Dan surface water sub-basin" (181) – despite these surface divides ("limits") being only a few hundred metres to kilometres away; that the groundwater catchments of the Hasbani and Wazzani springs are only "*likely*" to extend into Lebanon (182-3) – despite them being located deep within it; that the recharge area of the Liddan and "*probably*" also the Baniyas springs lie "primarily in Lebanon and *possibly* also in Syria" (183) – despite the facts that the Liddan springs are directly adjacent to, and downstream of, the border with Syria, and that the Baniyas lies squarely within (occupied) Syrian territory; and that the Liddan sub-basin "*may* have a much larger subsurface recharge area" than surface basin area (183) – even though the latter is only 17.6 km², even though only approximately 5 km² of this are upstream of the Liddan springs, and even though the hydrogeological study cited by ESCWA-BGR is quite definite that the Liddan *does* have a much larger subsurface than surface recharge area (Briemann, 2008: 201). The chapter suggests, moreover, that the three main headwaters of the Jordan "appear to be partially fed by the same aquifer or aquifer system on the eastern slopes of Mount Hermon" (182) – which, as any standard geological map of the area would reveal, is mistaken in two respects: these springs are not fed by the same aquifer, and these aquifers extend well beyond the eastern slopes of Jabal Ash-Shaykh (e.g. Guerre, 1969: 64; Briemann, 2008: 52-3). Here, ESCWA-BGR's apparent caution and 'objectivity' serve to cloud established hydrological facts which would contradict the chapter's general political thrust.

The overall effect of the above, in combination with the political labelling issues already discussed, is that the Jordan is depicted by ESCWA-BGR as a primarily Israeli river, to which Syrian, Lebanese, Jordanian and Palestinian claims are much less than is actually the case. The number of references to Israel in the subsection of the chapter on hydrology is telling: Israel is referred to 22 times, but Syria, Lebanon and Palestine (or West Bank) just 9, 6 and 3 times, respectively. ESCWA-BGR even state that the "Upper Jordan River [is] *formed* at the confluence of the headwater streams in Sede Nehemia, Israel" (184; italics added) – a statement which goes beyond the mainstream Zionist acknowledgement that the Jordan River begins at its source springs (e.g. Klot, 1994), and instead resembles the claim of the ring-wing Israeli political geographer, Arnon Soffer, that "three and three-quarter miles south of the Israeli-Lebanese border (...) the three streams unite to *form* the Jordan River" (Soffer, 1999: 123; italics added). In this instance, ESCWA-BGR's approach to the hydrology of the Jordan Basin is not only pro-Israeli, but adopts formulations akin to those of the Israeli right.

DEVELOPMENT AND USE

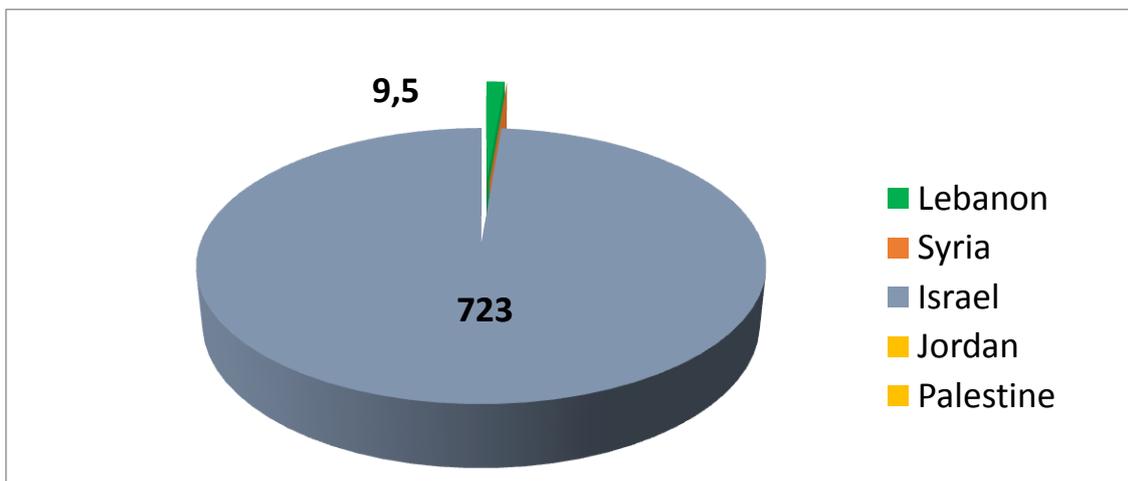
When the chapter turns to the basin's human transformation, we find the same pro-Zionist, Anti-Arab bias. Israel remains the primary focus of ESCWA-BGR's attention: it is referred to 104 times across the

⁸ We say '+13,000'; because actual rainfall would have to be considerably higher than 12,955 mm/yr supposed by ESCWA-BGR, given that not all rainfall becomes recharge, and given that some probably bypasses and underflows the spring.

subsection, but Syria only 49 times, and Palestine (or Palestinian, or West Bank – excluding references to Mandate Palestine) just 21 times. More than three pages are devoted to Israeli water development and use, less than half a page to development and use in Palestine. Yet simultaneously, whereas in ESCWA-BGR's discussion of hydrology, Israel's flow contribution to the Jordan basin is exaggerated, in their discussion of development and use, Israel's impact is understated and in places even valorised, while the negative impacts of Arab riparians are emphasised instead. This characterisation parallels and reinforces that documented above: Israel, implies the chapter, is the major contributor to the Jordan River, Arab riparians its chief exploiters – squarely the opposite of the actual situation.

The single most important fact about the modern Jordan Basin is that Israel appropriates almost the entire flow of the upper section of the River – appropriating, by one estimate, 65 times the volume of Lebanon, the only other riparian with access to the upper Jordan (Zeitoun et al., 2012: 55) – and thus leaves scarcely a drop of usable water for downstream riparians. Of over 600 Mm³/yr natural outflows (Courcier et al., 2005: 7) from Lake Tiberias, today only 5-8 Mm³/yr remain (figure for last decade: HSI, 2014: 430, Tab. 9.3). Indeed, total Israeli abstraction from Lake Tiberias and the upper Jordan River Jordan averages as much as 723 Mm³/yr (HSI, 2006: 353 – average abstraction during 1983/84-1995/96), not even including groundwater abstractions from within the Jordan Basin. These Israeli abstractions are the primary reason why, for most of the year, the Jordan River south of Lake Tiberias is a dry riverbed (see Figure 5). Today, total flows reaching the Dead Sea are almost entirely accounted for by the inflow of the Yarmouk River, generated within Syria and Jordan.

Figure 5. Riparian abstractions from the upper Jordan River and Lake Tiberias (Mm³/yr).



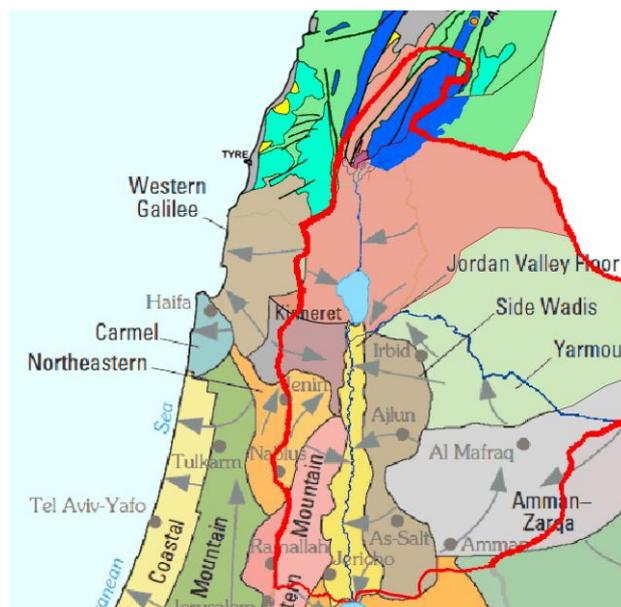
Sources: Israeli abstractions: HSI, 2006: 353; Lebanese abstractions: ESCWA-BGR, 2013: 196.

In ESCWA-BGR's hands, however, these crucial facts are part ignored, part misrepresented. Nowhere in the *Inventory* is it stated that Israel abstracts and utilises almost the entire flow of the upper Jordan River. No data for flow levels from Lake Tiberias is presented. And nowhere in its discussion of 'water resources management' is it noted that Israel is the largest user of water from the Jordan Basin (though this is noted in passing in the chapter introduction: 171). Even more significantly, the water use data provided by ESCWA-BGR fundamentally obscures the overall pattern of water use across the basin. According to ESCWA-BGR, Lebanon utilises 9-10 Mm³/yr from the Jordan Basin, Israel 583-640 Mm³/yr, Syria 453 Mm³/yr, Jordan 290 Mm³/yr, and the Palestinians zero (171, 197, 199) – these figures together conveying the impression that, while Israel is indeed the single largest user, Syrian utilisation of the Jordan basin is not a long way off the Israeli level. Yet this is misleading, as shown below.

The problem is clearly illustrated by data contradictions in the *Inventory's* discussion of Syrian water resources and use. ESCWA-BGR repeatedly put the total natural flow of the Yarmouk River at 450-500 Mm³/yr (170, 172, 191, 214). Yet they also claim, as already noted, that Syria abstracts an average 453 Mm³/yr – i.e. 90-100% of Yarmouk flows – this despite the fact that the Yarmouk sub-basin is shared with and also exploited by Jordan, and despite the fact that 35-225 Mm³/yr still flow from the Yarmouk, exploited by neither state (187). The root of these contradictions lies in the fact that in their discussion of Syria, and *only* in this case, do ESCWA-BGR include abstraction from groundwater sources in their water use data – a particularly egregious example of how misrepresentations can be produced through methodological inconsistency. Thus the relatively high figure of 453 Mm³/yr given for Syrian water use from the Yarmouk sub-basin includes abstraction from aquifers as well as surface flows, and even includes abstraction from aquifers which, whilst located within the Jordan Basin surface catchment area, only partially feed into the Jordan River. Around half of Syria's abstraction within the Yarmouk surface catchment area is from such groundwater sources, most prominently the 'Basalt West' aquifer, which roughly coincides with the Yarmouk surface catchment area (this particular aquifer is discussed in another chapter of the *Inventory*, with Syrian use estimated – and thus effectively 'double-counted' – at 189 Mm³/yr: 522). By including groundwater abstraction in their figures for Syria's water use from the Jordan Basin, ESCWA-BGR end up overstating its contribution to the destruction of the Jordan River.

By contrast, ESCWA-BGR's treatment of water abstraction in the Israeli, West Bank and Jordanian portions of the basin generally neglects groundwater – a methodological inconsistency which minimises Israeli abstraction levels, in particular. The estimates provided for Israeli use from the Jordan Basin exclude utilisation from its Lower Galilee and Eastern Galilee aquifers, and from aquifers emerging from the West Bank – the North-Eastern tip, and the North-Eastern and Eastern Aquifers – all of which lie at least partly within the Jordan Basin's surface catchment area (see Figure 6). The claim of zero Palestinian use excludes Palestinian abstraction from West Bank aquifers within the Jordan basin catchment, around 45 Mm³ (PWA, 2014: 8ff). There is no mention of Israeli settler abstraction from within this catchment area, which amounts to 44.8 Mm³/yr (B'Tselem, 2011: 37). And the data for Jordan do not include abstraction from its B₂A₇, Kurnub or Disi aquifers, despite these being located within the Jordan Basin area.

Figure 6. Groundwater basins in the Jordan River Basin.



Sources: EXACT, 1999; and Walley, n.d.

Other data problems also result in an understatement of Israel's exploitation of the basin. ESCWA-BGR's summary estimates of total Israeli water use from the Jordan River (171, 198) exclude surface water withdrawn south of Lake Tiberias, which according to one of their sources amounts to 196 Mm³/yr (FOEME, 2011: 30). Their low-end estimate of total annual Israeli use from the basin of 583 Mm³/yr (198-9) is attributed to Zeitoun et al. (2012), but this source includes no such figure, and claims to the contrary that Israeli use from the entire basin may be as high as 800 Mm³/yr (2012: 30). This is a clear instance of ESCWA-BGR misrepresenting their sources.

In sum, the abstraction data provided by ESCWA-BGR is flawed on multiple levels. If ESCWA-BGR had compared surface water use alone, they might have concluded that Syria currently utilises around 200 Mm³/yr (this, at least, is the most recent figure quoted by ESCWA-BGR: 197), instead of the 453 Mm³/yr that they actually highlight. Alternatively, if the same methodology used in relation to Syria had been used to calculate Israeli water use within the basin, ESCWA-BGR might have arrived at a figure as high as 930 Mm³/yr (HSI, 2005: 18). Either way, the conclusion should have been inescapable: that Israel is the major exploiter of the Jordan River, and that the impact of all Arab riparians combined, Syria included, is substantially lower.

But the misrepresentations do not end there. The chapter repeatedly asserts that the flow of the upper Jordan River "remains nearly natural" (170; also 182, 189, 191), and repeatedly presents data suggesting that Israel has somehow *increased* the flow of the upper Jordan from the "near-natural conditions" of the 1950s: in the 1950s, so we are told, 605 Mm³/yr flowed into Lake Tiberias, whereas today 616 Mm³/yr do so (172, 186, 191). This is all deeply misleading. The upper sections of the Jordan River within Israel were the first parts to be fundamentally transformed, including through the drainage of the Huleh Valley; Israel abstracts significant volumes from the upper Jordan, as is shown elsewhere, if still under-represented, in the chapter (198); and salinity and pollution levels in the upper Jordan are anything but natural, as the chapter itself shows (205, 207).

Conversely, the chapter conveys the strong impression that it is Syria and to a lesser extent Jordan, which have most transformed the Jordan Basin through their dam-building and diversions, its subsections on water development in Syria and Jordan mentioning dams 26 times and nine times, respectively, while the equivalent (and longer) subsection on Israel mentions dams only twice. Only Syria is castigated for its "excessive pumping and diversions" from the basin (191). But ESCWA-BGR's emphasis on Syrian dams is highly problematic, resulting from both data errors and the inconsistent application of an inappropriate methodology. The data errors first: ESCWA-BGR misread their key source and hence overstate Syrian dam capacity: the capacities of the Jisr ar-Raqqad and Ghadeer al-Bustan dams, for instance, are put by ESCWA-BGR at 9.2 and 12 Mm³, respectively (196), but their source lists them as having capacities of 0.9 and 0.12 Mm³ only (Syrian Arab Republic and Jordan, 1987).

Next the inconsistencies: ESCWA-BGR refer to 38 dams on the Yarmouk, this including very small dams and spillways with capacities of less than 5 Mm³ (197). By contrast, no equivalent small Israeli structures are mentioned, such as those which dam the many fishponds near Bisan and Gilbo'a, and together account for nearly 100 Mm³/yr water use (FOEME, 2011: 6). There is likewise no mention of the many small Israeli settler dams in the occupied West Bank and annexed Golan (discernible on Google maps), or of small capacity dams within Jordan. Furthermore, only with regard to Syria do ESCWA-BGR provide figures for the theoretical total dam capacity: they put Syria's total dam capacity at 117 Mm³ (197) but neglect to provide equivalent figures for Jordan and Israel, both of which have, by ESCWA-BGR's definition, significantly higher total dam capacity within the Jordan Basin (if we treat Israel's Deganiah weir as a dam, as ESCWA-BGR do, then it has a design capacity of up to 1104 Mm³/yr).

Finally, ESCWA-BGR's data method on dams is inappropriate. The basic data provided by ESCWA-BGR on dams concerns their theoretical "storage capacities", that is, the volume of water that they were designed to store (41, 196, 201). The problem is that this tells us very little about actual water

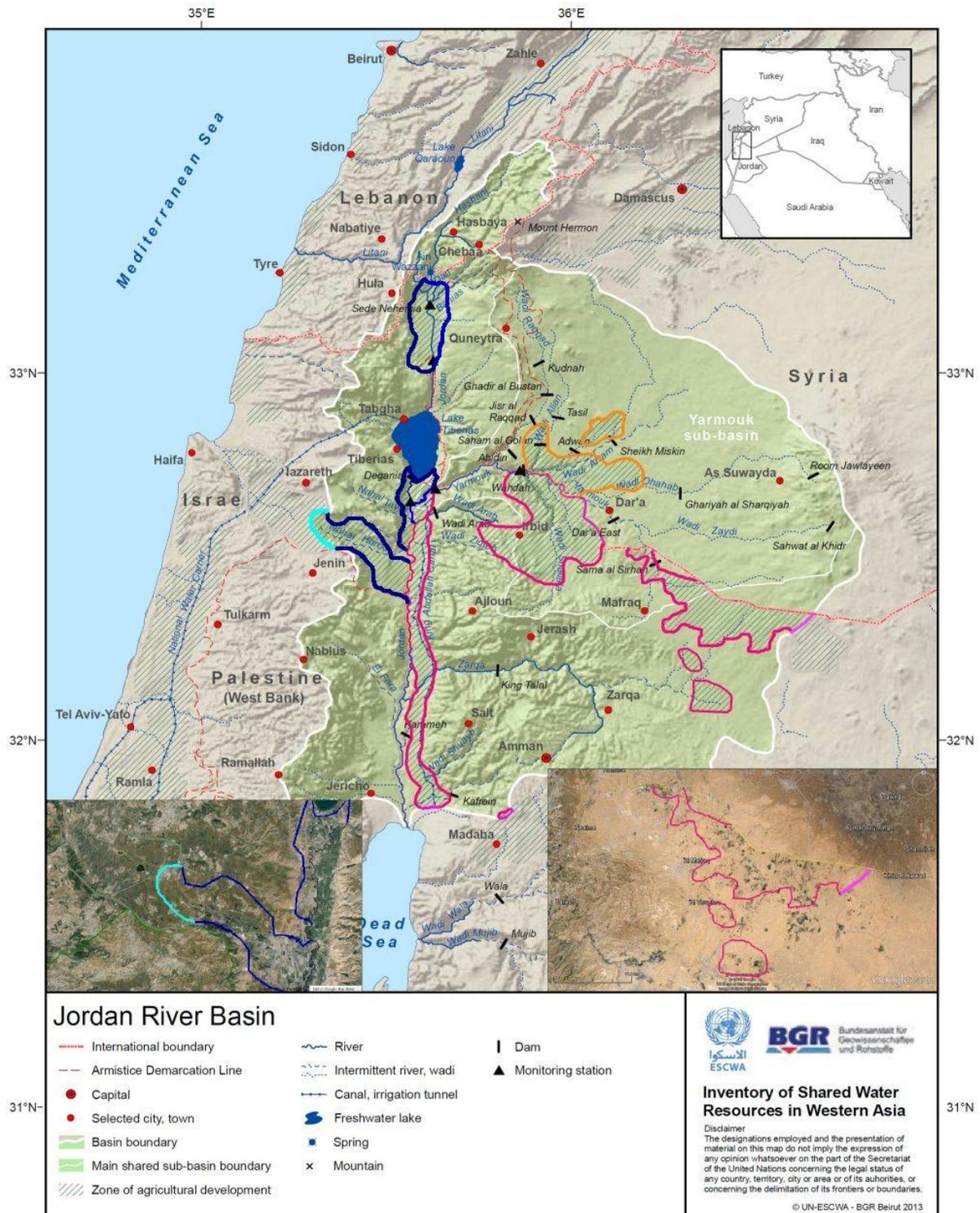
diversion and use, since the actual volume of water stored is often very different from theoretical capacity – and in some cases never reaches it, as in the case of Al-Wahdah Dam on the Yarmouk (196) – and since the amount of water diverted and used from a dam is as much a function of the volume of inflow as of the volume of water stored. Most of Syria's Yarmouk River dams, for instance, are built in the high flatland plains, their reservoirs depending almost entirely on direct rainfall and superficial storm runoff: in such cases, storage capacity is generally far higher than average annual abstraction. By contrast, in Jordan most dams are located in deep canyons and benefit from strong groundwater baseflows all year round: here, the design storage capacity is typically only a fraction of the accumulated amount that is stored, abstracted and used each year (for example, Wadi Shu'eib Dam in Jordan has a design capacity of only 1.43 Mm³, but with baseflows as high as 11.3 Mm³/yr: Margane et al., 2002: 34). In short, ESCWA-BGR systematically overemphasise the impact of Syria's dam-building on the Jordan Basin, whilst minimising, and in places even obscuring, the much deeper transformations effected by Jordan and especially Israel.

Worse still, while as already noted Syria is singled out for its "excessive pumping and diversions", Israel's National Water Carrier is described in glowing terms as an "ambitious scheme" inspired by a "vision" and "quest", for which "Israel invested millions of dollars" (197-8). Drops in the level of Lake Tiberias are ascribed to "rising" – but apparently not "excessive" – demand, plus that long-standing alibi to hydro-hegemony, "more frequent droughts" (186). The language here is reminiscent of Zionist mythology, according to which Jewish settlers, inspired by high ideals, aspired to transform and repair a land degraded by centuries of Arab rule, and according to which contemporary Arab societies can still not be trusted to protect their natural environments (George, 1979; Neumann, 2011: Broich, 2013). One would not have imagined from ESCWA-BGR's language that it is in fact Israel's National Water Carrier – which transfers as much as 523 Mm³/yr *out of* the Jordan Basin (HSI, 2008a: 408), dwarfing Syria's putatively "excessive diversions" – which is the principal destroyer of the Jordan River.

The chapter is similarly misleading in its discussion of water use. It exaggerates the area under irrigation in Jordan: several areas identified as irrigated are barely so at all, including the Badawi desert area to the east of Mafraq (see Figure 7); and moreover, much of the irrigation within the Jordanian highlands is from groundwater sources that, though partly located within the basin area, do not feed into the Jordan surface catchment. By contrast, Israeli irrigation within (and from) the Jordan Basin is fundamentally understated. There is no reference at all – either within graphics or text – to the large and intensively irrigated areas of settler agriculture that exist within the West Bank and the Golan Heights: once again, we find that the chapter somehow overlooks Israel's twin occupations (see Figure 8). And though there is brief reference to Israel's use of Jordan Basin water for irrigation in the coastal plain and southern Israel (199), there is no mention of the single most important comparative point: that only Israel is undertaking large-scale out-of-basin water transfers from the Jordan Basin in support of irrigated agriculture.

The chapter's discussion of water use is flawed in another outstanding respect, namely its omission of any mention of, let alone data on, per capita water use across the basin. Admittedly, most other chapters in the *Inventory* do not provide these data either. But it would be frankly incredible if ESCWA-BGR had deemed this crucial matter outside the scope of an inventory of shared water resources. Without such information, it is impossible to establish just how asymmetrical the existing allocation of water is across the Jordan Basin. On the basis of ESCWA-BGR's Jordan Basin chapter alone, one would have no idea that, for instance, average overall Israeli per capita water use is almost five times higher than average West Bank Palestinian use (IWA, 2012b: 14; PWA, 2012: 17); or that most Palestinian communities experience regular domestic water cuts, and many go months without piped water each year (Selby, 2003: 171-81); or that some Palestinian communities receive networked water supplies of only 20 litres per capita per day (B'Tselem, 2011: 38; OCHA, 2011: 13). And one would not know that overall per capita settler allocation in the Jordan Valley is 13,086 litres per capita per day (B'Tselem 2011: 10, 39), 81 times higher than the Palestinian West Bank average for overall supplies (PWA, 2012:

Figure 7. ESCWA-BGR's depiction of irrigated areas ('zones of agricultural development') in the Jordan Basin, juxtaposed with satellite images of the putative irrigated areas in Jordan and Israel.



Sources: ESCWA-BGR, 2013: 172 and Google Earth, 2014.

accurate assessment would be that they have been extremely effective – specifically, in facilitating settlement expansion and negating Palestinian demands for reallocation (Messerschmid, 2008: 12; Selby, 2013). ESCWA-BGR both downplay and obscure the impacts of Israel’s occupations on patterns of water mismanagement, hydrological mal-development and water insecurity in the West Bank and Golan Heights.

CONCLUSIONS

This article has demonstrated that ESCWA-BGR’s *Inventory* chapter on the Jordan River Basin is both technically flawed and politically biased. The chapter refers to Israel more often and at greater length than any other riparian, despite Israel accounting for just 10% of the Jordan Basin area and even less of the net riparian inflows. It conveys the impression that the Jordan River, and its upper sections in particular, are essentially Israeli. It obscures the fact that the Jordan headwaters are completely fed by rain falling over Lebanon and Syria. It understates Israel’s appropriation and diversion of the river, whilst exaggerating and criticising the damming undertaken by Syria. It likewise exaggerates Jordanian irrigation, whilst failing to register that Israel is the one riparian to transfer Jordan River water out-of-basin for irrigation purposes. It offers only the briefest of discussions of the impacts of the Israeli occupations of the West Bank and Golan on water development and use. It omits crucial data – most notably, on riparian flow contributions and on per capita use – that might have helped to present a more rounded and accurate picture. Despite its numerous technical inconsistencies, in short, the chapter somehow manages to produce a consistently pro-Israeli misrepresentation of the hydrology and politics of the basin.

At the same time, the article also illustrates the number and diversity of the representational practices through which hegemonic narratives get reproduced and sustained. These include:

1. *misrepresentations* – both of sources, e.g. on Israeli water use, and Syria’s dams; and of particular realities, e.g. the understatement of the Israeli settler population within the basin, and the claim that water flow in the upper Jordan is "nearly natural";
2. the *omission* of evidence contradicting the hegemonic narrative in question – e.g. the omission of information on riparian and groundwater flow contributions, and per capita water use; and the failure to register that only Israel is undertaking large-scale out-of-basin water transfers;
3. the inappropriate attribution of *uncertainty* – specifically through repeated equivocations on the origins of the Jordan headwaters;
4. the use of *inappropriate methods* of description and analysis – e.g. the characterisation of the Jordan Basin as comprising discrete sub-basins; the delineation of the Jordan Basin on the basis of surface flows alone; and the use of the specific discharge method;
5. *inconsistency* in the application of data analysis methods – e.g. the inclusion of groundwater abstraction in water use data for Syria, but not for Israel; and the use of figures for theoretical dam capacity in the case of Syria, but not in relation to Israel;
6. the use of *words and images* that reflect hegemonic narratives – e.g. the inappropriate use of Zionist-Hebrew terms; and the photographic depiction of Israeli waters as abundant, but Arab waters as insignificant;
7. *explicit evaluations* – e.g. the valorisation of Israel’s "ambition" and "quest", in contrast to ESCWA-BGR’s criticisms of Syria’s "excessive pumping and diversions";
8. a *disproportionate focus* on the hegemon – especially the disproportionate number of references and the disproportionate number of pages devoted to Israel; and

9. *de-politicisation* – as discussed further below.

What might account for how such a systematically Israel- and hegemon-friendly piece of work could have been produced in the name of ESCWA, an organisation of Arab states which one might expect to promote a counter-hegemonic vision of the Jordan basin?

Of the many possible reasons and causes, two are in our view worth highlighting. To start with, the chapter's pro-Israeli orientation is very clearly a function of ESCWA's and the Middle East's integration into, and dependence on, Western-dominated circuits of knowledge production. Its orientation evidently reflects the fact that most academic and policy discourse on the Jordan Basin, the majority of which is produced by Western experts and institutions, assumes and operates with Israeli narratives, framings and emphases. Moreover, it also doubtless reflects the fact that the *Inventory*, though published in the name of ESCWA, was actually produced by a German government agency. The *Inventory's* wholesale lack of criticism of Israel's water policies and occupations, its tone of admiration for those "Zionist leaders in Europe" who inaugurated the "quest for water in Palestine" (197), and its contrary overstatements and criticisms of Arab water policies are at one with the still dominant Orientalist European view of Israel as a beacon of civilisation in the Middle East (Said, 1991), though they also perhaps reflect specifically German perspectives and policies. In the mid-1950s, during the Johnston Mission negotiations over the regional development of the Jordan Basin, the Arab technical committee rightly criticised the Johnston Plan's exclusion of groundwater from its definition of the boundaries of the Jordan watershed (Alatout, 2011: 225), effectively taking an independent, post-colonial and counter-hegemonic position on the political geography of the basin. ESCWA, by contrast, assume and put their name to the very hydro-hegemonic geography that was advocated by Johnston. It is hard but they conclude that the change is in large measure of function of ESCWA's integration into and dependence upon Western-dominated circuits of funding, power and knowledge.

But secondly and in our view equally important, many of the chapter's omissions and evasions are functions of a misplaced – though deeply embedded and institutionalised – faith in the virtue of neutrality. Throughout, the chapter expands at length on safe 'technical' subjects, whilst skirting over more controversial 'political' matters: witness, for instance, the six pages devoted to water-quality issues (204-9), compared with the cursory treatment of Israel's occupation of the West Bank (202), and complete neglect of the impacts of illegal settlements on water use in the West Bank and Golan. Euphemism is preferred to precision: the chapter suggests, for instance, that it is the "unevenly developed" state of the Jordan Basin which accounts for Palestinians' lack of access to the Jordan River (171) – when it was forced 'de-development' by the Israeli army, not an uneven process of nonetheless progressive development, which led to the destruction of Palestinian pumps on, and all other access to, the Jordan River from 1967 onwards (ECOSOC, 1985: para. 202; Al-Haq, 2013: 34; and on 'de-development' see esp. Roy, 1995; Messerschmid, 2014). Nowhere does the chapter come close to matching the statement by Rima Khalaf, Under-Secretary General of ESCWA, in her Foreword to the *Inventory*, that "Israeli occupation will continue to hamper the ability of the Palestinian people to exercise full sovereignty over their water resources" (vii).

This is not by any means to value political rhetoric over technical detail. It is instead to insist that neutrality is not equivalent to objectivity; that objective, evidence-based in-depth analyses of power, politics and domination are bound to have a critical ring (Moore, 1996: 522-3); and, as Archbishop Desmond Tutu has put it, that "if you are neutral in situations of injustice, you have chosen the side of the oppressor" (Quigley, 2003: 8). Contemporary mainstream development practice uniformly aspires to being neutral and apolitical, including on water issues. But it is an illusion to believe that water development, management or use can be purely technical and apolitical, or that knowledge about it can be neutral. Moreover, as many critical analyses of the development 'anti-politics machine' have demonstrated, anti-politics usually ends up being aligned with dominant interests, and can as a result have deeply regressive political consequences (Ferguson, 1990; Duffield, 2001; Mitchell, 2002). So it is

in this volume: as in a great deal of mainstream water discourse (see e.g. Swyngedouw, 2013), politically sensitive topics are skimmed over or skirted around, with the effect that many of the most important causes of water insecurity do not get adequately addressed – including, in this case, Israel’s illegal occupations and settlements of the West Bank and the Golan.

Irrespective of the precise reasons behind the chapter’s shortcomings, these are in our view so numerous and pervasive that it requires not just minor revision, but a retraction and complete rewrite – in line with the statements from the Palestinian Authority and Palestinian civil society. Its technical errors and pro-Israeli misrepresentations would, in a minor publication, be alarming and a reason for brief consternation, but no more. However, as noted at the outset, the *Inventory* could become the standard reference work on the region’s waters for years to come. It would be a great shame if ESCWA, through this chapter, ended up buttressing and reinforcing Israel’s coercive and, in large measure, illegal actions in the Jordan River Basin.

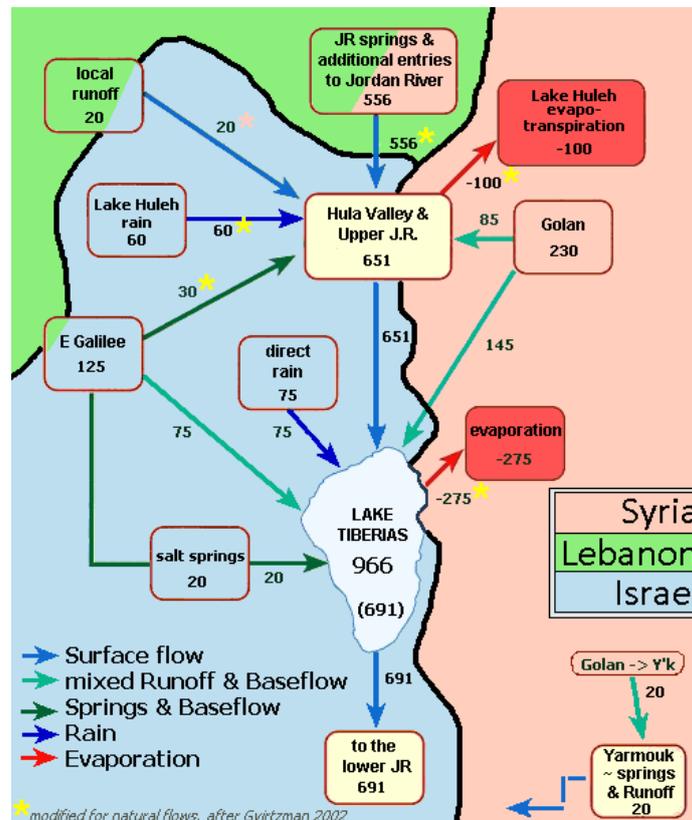
ANNEX

Natural net inflows to the upper Jordan River and Lake Tiberias, by riparian origin

	Lebanon	Syria	Israel	Sum
Hasbani springs	147			147
Liddan springs	130	130		260
Banias springs		149		149
Local runoff from NW	14		6	20
Golan (mixed flows)		85		85
Eastern Galilee (mixed flows)	2		28	30
Rain over Lake Huleh			60	60
Eastern Galilee to Lake Tiberias (mixed)	4		71	75
Salt springs			20	20
Rain over Lake Tiberias			75	75
Golan to Lake Tiberias (mixed)		145		145
Gross inflows	297	509	260	1066
Huleh evaporation			-100	-100
Lake Tiberias evaporation			-275	-275
Net inflows	297	509	-115	691
<i>Percent</i>	<i>43</i>	<i>74</i>	<i>-17</i>	<i>1</i>

Notes: Source spring flows amount to 556 Mm³/yr as shown in the graph below. 'Mixed flows' means a combination of runoff, baseflows and groundwater spring flow. Most figures are from Gvirtzman (2002: 35), but some were altered to account for natural flow conditions. Liddan, Banias and Hasbani springs are quoted from: HSI, 2008b: 300; and IWA-HSI, 2010: 39ff. Liddan spring discharge is after Kliot, 1994: 179. Note that the transboundary groundwater flow of the Liddan springs originates exclusively from Syria and Lebanon. The Table includes direct rain over and evaporation from Lake Huleh under natural conditions (neither included by Gvirtzman). For the net contribution, evaporation is subtracted.

Natural inflows and outflows at the upper Jordan River, with riparian origin of flows indicated



Source: Modified after Gvirtzman (2002: 35)

REFERENCES

- AIDA (Association of International Development Agencies). 2013. Failing to make the grade. Report of the Association of International Development Agencies. www.oxfam.org/sites/www.oxfam.org/files/aida_eu_public_report_final_web_corrected.pdf (accessed 27 October 2014)
- Alatout, S. 2011. Hydro-imaginaries and the construction of the political geography of the Jordan River: The Johnston Mission 1953-56. In Davis, D. and Burke III, E. (Eds), *Environmental imaginaries of the Middle East and North Africa*, pp. 218-45. Athens: Ohio University Press.
- Al-Haq. 2013. *Water for one people only: Apartheid and the discriminatory denial of access to water in the OPT*. Ramallah: Al-Haq.
- Amnesty International. 2009. *Troubled waters: Palestinians denied fair access to water*. London: AI Publications.
- Attili, S. 2013. Letter from Shaddad Attili, Head, Palestinian Water Authority to Rima Khalaf, UN-ESCWA. 23 October 2013.
- Brielmann, H. 2008. Recharge and discharge mechanism and dynamics in the mountainous northern Upper Jordan River Catchment, Israel. PhD thesis. LMU-Munich.
- Broich, J. 2013. British water policy in Mandate Palestine: Environmental orientalism and social transformation. *Environment and History* 19(3): 255-81.
- B'Tselem. 2011. *Dispossession and exploitation: Israel's policy in the Jordan Valley and Northern Dead Sea*. Jerusalem: B'Tselem.
- City Population. N.d. www.citypopulation.de/Palestine.html (accessed 27 October 2014)

- Courcier, R.; Venot, J.-P. and Molle, F. 2005. *Historical transformations of the lower Jordan River basin (in Jordan): Changes in water use and projections (1950-2025)*. Colombo, Sri Lanka: Comprehensive Assessment Secretariat.
www.iwmi.cgiar.org/assessment/files_new/publications/CA%20Research%20Reports/ColouredCARR9.pdf
 (accessed 27 October 2014)
- Duffield, M. 2001. *Global governance and the new wars: The merging of development and security*. London: Zed Books.
- ECOSOC (UN Economic and Social Council). 1985. Report of the Secretary-General prepared in pursuance of General Assembly decision 39/442. 17 June. UN Doc. A/40/381-E/1985/105.
- ESCWA-BGR (UN Economic and Social Commission for West Asia-Bundesanstalt für Geowissenschaften und Rohstoffe). 2013. *Inventory of shared water resources in Western Asia*. New York: United Nations.
www.escwa.un.org/information/pubaction.asp?PubID=1362 (accessed 2 April 2015)
- ESCWA-BGR. 2014. Inventory of shared water resources in Western Asia: Corrigendum.
www.escwa.un.org/information/pubaction.asp?PubID=1362 (accessed 2 April 2015)
- EXACT (Executive Action Team). 1999. *Water data banks project*. Executive Action Team (EXACT). Multilateral Working Group on Water Resources. Updated: October 7, 2005. <http://exact-me.org/overview/p11.htm>
 (downloaded 18 February 2015)
- Ferguson, J. 1990. *The anti-politics machine: 'Development', depoliticization and bureaucratic power in Lesotho*. Cambridge: Cambridge University Press.
- FMEP (Foundation for Middle East Peace). N.d. Settlements in East Jerusalem. Washington, DC: FMEP.
www.fmep.org/settlement_info/settlement-info-and-tables/stats-data/settlements-in-east-jerusalem
 (accessed 24 July 2014)
- FoEME (Friends of the Earth Middle East). 2011. *Roadmap for the rehabilitation of the Lower Jordan River*. Prepared by DHV MED on behalf of FoEME Amman, Bethlehem and Tel Aviv: FoEME.
[http://foeme.org/uploads/13209208250~%5E\\$%5E~DHV_Full_Report_11.2011.pdf](http://foeme.org/uploads/13209208250~%5E$%5E~DHV_Full_Report_11.2011.pdf) (accessed 27 October 2014)
- Geneva Initiative. 2009. Water. Annex 10 of the Geneva Accord. www.geneva-accord.org/images/PDF/water.pdf
 (accessed 27 October 2014)
- George, A. 1979. Making the desert bloom: A myth examined. *Journal of Palestine Studies* 8(2): 88-100.
- Gregory, D. 1995. Imaginative geographies. *Progress in Human Geography* 19(4): 447-85.
- Guerre, A. 1969. Etude hydrologique préliminaire des Karsts Libanais. Hannon: *Revue Libanaise de Géographie* 4: 64-92.
- Gvirtzman, H. 2002. *Israel water resources – Chapters in hydrology and environmental sciences*. Jerusalem: Yad Ben-Zvi Press (in Hebrew).
- HSI (Hydrological Service of Israel). 2005. *Development of utilization and status of water resources in Israel until autumn 2004*. Jerusalem: HSI (in Hebrew).
- HSI. 2006. *Development of utilization and status of water resources in Israel until autumn 2005*. Jerusalem: HSI (in Hebrew).
- HSI. 2008a. *Development of utilization and status of water resources in Israel until autumn 2007*. Jerusalem: HSI (in Hebrew).
- HSI. 2008b. *Hydrological yearbook of Israel. State of Israel. Water Commission, Hydrological service, Annual report*. Jerusalem: HSI (in Hebrew).
- HSI. 2014. *Development of utilization and status of water resources in Israel until autumn 2011*. Jerusalem: HSI (in Hebrew).
- Israel and the PLO (Palestine Liberation Organisation). 1995. Interim Agreement on the West Bank and the Gaza Strip. Washington, DC, 28 September.
- IWA (Israeli Water Authority). 2012a. Book of water allocations until the end of the year 2011. Report no. RT1003, Version no. 1, Tel Aviv: State of Israel, Water Authority, 26 Feb 2001, 552p. (in Hebrew).
www.water.gov.il/Hebrew/ProfessionalInfoAndData/Allocation-Consumption-and-production/DocLib/water-allocation-end2011.pdf (accessed 27 Oct 2012)

- IWA. 2012b. Long-term master plan for the national water sector. Part A – Policy Document, Version 4. Jerusalem: IWA. www.water.gov.il/Hebrew/Planning-and-Development/Planning/MasterPlan/DocLib4/MasterPlan-en-v.4.pdf (accessed 27 Oct 2014)
- IWA-HSI (Israeli Water Authority and Hydrological Service of Israel). 2010. Summary of the rainy season 2009/2010. Jerusalem: IWA-HSI (in Hebrew). www.water.gov.il/Hebrew/ProfessionalInfoAndData/Data-Hidrologeime/DocLib4/Summary2009-10.pdf (accessed 27 Oct 2014)
- Kliot, N. 1994. *Water resources and conflict in the Middle East*. London: Routledge.
- Margane, A.; Hobler, M.; Almomani, M. and Subah, A. 2002. Contributions to the hydrogeology of Northern and Central Jordan. *Geologisches Jahrbuch* 68(52): 3-52.
- Messerschmid, C. 2008: What price cooperation? Hydro-hegemony in shared Israeli/Palestinian groundwater resources. In Aliewi, A.; Assaf, K. and Jayoussi, A. (Eds), *Proceedings of the 1st International Conference on Sustainable Development and Management of Water in Palestine*. Amman, Jordan, August 2007. El-Bireh: HWE- UNESCO-PWA.
- Messerschmid, C. 2014. Hydro-apartheid and water access in Israel-Palestine: Challenging the myths of cooperation and scarcity. In Turner, M. and Shweiki, O. (Eds), *Decolonizing Palestinian political economy: De-development and beyond*, pp. 53-75. London: Palgrave Macmillan.
- Mitchell, T. 2002. *Rule of experts: Egypt, techno-politics, modernity*. Berkeley: University of California Press.
- Molle, F. 2009. River-basin planning and management: The social life of a concept. *Geoforum* 40(3): 484-94.
- Moore, B. 1966. *Social origins of dictatorship and democracy: Lord and peasant in the making of the modern world*. Boston: Beacon Press.
- Neumann, B. 2011. *Land and desire in early Zionism*. Trans. H. Watzman. Waltham, MA: Brandeis University Press.
- OCHA (Office for the Coordination of Humanitarian Affairs). 2011. *Displacement and insecurity in Area C of the West Bank*. Jerusalem: OCHA, Occupied Palestinian Territory.
- Palestinian water experts. 2013. Letter From 23 Palestinian water experts to Rima Khalaf, UN-ESCWA. 5 December 2013.
- PCBS (Palestinian Central Bureau of Statistics). N.d. Estimated population in the Palestinian Territory mid-year by governorate, 1997-2016. Ramallah: PCBS. www.pcbs.gov.ps/Portals/Rainbow/Documents/gover_e.htm (accessed 21 July 2014)
- PWA (Palestinian Water Authority). 2012. *Water supply 2010*. Ramallah: PWA.
- PWA. 2014. Status Report of Water Resources in the occupied State of Palestine -2012. Ramallah, PWA. October 2013. www.pwa.ps/userfiles/file/%D8%AA%D9%82%D8%A7%D8%B1%D9%8A%D8%B1/%D8%AA%D8%B5%D9%86%D9%8A%D9%81%201/WR%20STATUS%20Report-final%20draft%202014-04-01.pdf (accessed February 2015)
- Quigley, W. 2003. *Ending poverty as we know it: Guaranteeing a right to a job*. Philadelphia: Temple University Press.
- Rimmer, A. 2006. System hydrology tools for the upper catchments of the Jordan River and Lake Kinneret, Israel. Paper submitted to the Fifth biennial Rosenberg International Forum on Water Policy, September 6-11, 2006, Banff, Canada.
- Roy, S. 1995. *The Gaza Strip: The political economy of de-development*. Washington, DC: Institute for Palestine Studies.
- Said, E. 1991. *Orientalism*. London: Penguin.
- Selby, J. 2003. *Water, power and politics in the Middle East: The other Israeli-Palestinian conflict*. London: IB Tauris.
- Selby, J. 2013. Cooperation, domination and colonisation: The Israeli-Palestinian Joint Water Committee. *Water Alternatives* 6(1): 1-24.
- Shlaim, A. 1988. *Collusion across the Jordan: King Abdallah, the Zionist movement, and the partition of Palestine*. Oxford: Oxford University Press.
- Soffer, A. 1999. *Rivers of fire: The conflict over water in the Middle East*. Lanham: Rowman and Littlefield.
- Swyngedouw, E. 2013. UN Water report 2013: Depoliticizing water. *Development and Change* 44(3): 823-35.

- Syrian Arab Republic and Jordan. 1987. Agreement concerning the utilization of the Yarmouk waters. Amman, 3 September. www.internationalwaterlaw.org/documents/regionaldocs/Jordan-Syria-1987.pdf (accessed 27 October 2014)
- UNGA (UN General Assembly). 1997. Convention on the law of non-navigational uses of international watercourses. Adopted 21 May 1997. <http://legal.un.org/avl/ha/clnuiw/clnuiw.html> (accessed 19 May 2015)
- US NAS (United States National Academy of Science). 1999. *Water for the future: The West Bank and Gaza Strip, Israel, and Jordan*. Washington, DC: National Academy Press.
- Walley, C.D. (n.d.). The Geology of Lebanon – A summary; AUB Digital Documentation Center, Beirut (no year). Figure 1 at <http://almashriq.hiof.no/ddc/projects/geology/geology-of-lebanon/fig1.html> (accessed 18 February 2015)
- Weinberger, G.; Livshitz, Y.; Givati, A.; Zilberbrand, M.; Tal, A.; Weiss, M. and Zurieli, A. 2012. *The natural water resources between the Mediterranean Sea and the Jordan River*. Jerusalem: IWA. www.water.gov.il/hebrew/professionalinfoanddata/data-hidrologeime/docLib4/water_report-mediterranean-sea-and-the-jordan.pdf (accessed 27 October 2014)
- Wolf, A.T.; Natharius, J.A.; Danielson, J.J.; Ward, B.S. and Pender, J.K. 1999. International river basins of the world. *International Journal of Water Resources Development* 15(4): 387-427.
- World Bank. 1993. *Water resources management: A World Bank policy paper*. Washington, DC: World Bank.
- World Bank. 2009. *Assessment of the restrictions on Palestinian water sector development*. Washington, DC: World Bank.
- Zeitoun, M. 2008. *Power and water in the Middle East: The hidden politics of the Palestinian-Israeli water conflict*. London: IB Tauris.
- Zeitoun, M. and Mirumachi, N. 2008. Transboundary water interaction I: Reconsidering conflict and cooperation. *International Environmental Agreements* 8(4): 297-316.
- Zeitoun, M.; Eid-Sabbagh, K.; Dajani, M. and Talhami, M. 2012. *Hydro-political baseline of the upper Jordan River*. Beirut: Association of the Friends of Ibrahim Abd el Al.

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