Annotated reference list with methodological details regarding the calculation of values in the dams, rivers & canals databases.

ADB (2011)

*Monthly mean flows for the Kaveri were taken from Figure 56, p. 84 of ADB (2011) and averaged over the period 2001-2011, which is the period covered by the report. Data comes from the Upper Anicut gauging station, also known as Upper Anaicut and Mokkombu Dam. These data were used to calculate both the mean annual discharge in Table 4 and the mean monthly discharge values of Fig.4 and Table 5.*

Bihar State Hydroelectric Power Corporation Limited (BSHPCL), Indrapuri Reservoir Project (450 MW): Salient Features, http://www.bshpcltd.com/Indrapuri.HTM, Accessed 09 10 2016 (2007).

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*Mean annual discharge data for the Betwa comes from Table 6, observed discharge at Rajghat. Although the table caption gives the units as MCM, I believe this is a typo – units of m3s-1 ‑are consistent with other sources for the Betwa.*

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*The 2015 Integrated Hydrological Data Book was used to calculate mean annual discharge for four rivers at their terminal gauging stations, using annual totals compiled by the Central Water Commission. For each river, the following data were used. (1) Penna at Nellore station, 2002-2012 with 2006-2007 missing. Table 5 Part VIII, pg. 197. (2) Achankovil at Thumpamon station, 2009-2012. Table 5 Part IX, pg. 202. (3) Pamba: data from Malakkara station, 2009-2012. Table 5 part IX, pg. 201. (4) Netravati: data from Bantwal station, 2002-2012 with 2007-2009 missing. Table 5 part IX, pg. 200. Although longer periods of record were available for some rivers (e.g., Achankovil median annual discharge 1977-2012, Table 7 Part IX, pg. 255), the 2002-2012 data were selected to better represent current conditions of the rivers.*

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*Sapta Gandaki Dam height/storage capacity/submergence area from Dhungel & Pun (2009), Table 3.3 pg. 80, which is itself compiled from Water and Energy Commission Secretariat (WECS) of Nepal Bulletin* ***7****(1), December 1995.*

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Expert Appraisal Committee (EAC), Minutes of the 71st meeting of the Expert Appraisal Committee for River Valley and Hydroelectric Projects constituted under the provisions of EIA Notification 2006, 20-21 Jan 2014, New Delhi, India, 89 pp. Accessed 09 10 2016, <http://environmentclearance.nic.in/writereaddata/Form-1A/Minutes/0_0_311412561216172ndMinutesofEACmeeting.pdf> (2014).

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*Gourdji et al. (2005) present charts obtained from the NWDA during a trip to India in 2004 (Appendix III, pgs. 115-117). These charts give exact transfer volumes for links affecting the Ganges and Brahmaputra basin, which are not otherwise available due to the classification of NWDA Feasibility Reports for these basins. Values from these charts were used in the canals database. The charts also give 75% dependable yield for the rivers – this value was used for the Torsa discharge, as no mean annual or 50% dependable yield (median) value could be located. 75% dependable yield corresponds to the 1st quartile of discharge.*

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*Gourdji et al. (2008) use the values from the Gourdji et al. (2005) charts to perform a similar analysis to this study for the total change in flow at Farakka Barrage in the Ganga basin given full implementation of the NRLP. Since 2008, changes in the plans for diversions from the Gandak and Ken rivers have been published. Our study uses these updated values; an additional change is to examine discharge at Hardinge Bridge rather than at Farakka Barrage, so that diversions to the Hooghly are also included. We note that otherwise, our values for total river changes match those of Gourdji et al. (2008) for the Ganga basin tributaries.*

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http://wrmin.nic.in/writereaddata/1-2-1\_ILR%20STATUS,%20ISSUES%20AND%20CHALLENGES.pdf.

Institute of Water Modeling (IWM), Ganges river basin modelling: final report, Report number 103885, Washington, D.C.: World Bank Group (2010).

*Because the Ganga basin is classified, exact measurements of discharge for the Ganga and its tributaries are not available. Therefore, we have primarily relied on estimates by the Institute of Water Modeling for the current mean annual discharge of Ganga tributaries. Values in this study come from IWM (2010), Fig. 5.58, pg. 100 – Ganges basin flows in base scenario. The base scenario in IWM (2010) covers the period 1998-2007. Discharge values in IWM (2010) are simulated using MIKE BASIN, a model that represents the hydrology of a basin including rainfall-runoff processes, snowmelt, and reservoirs and dams. Existing infrastructure including irrigation and urban water use, dams, and hydropower reservoirs are included in the IWM (2010) analysis for the base scenario. We note that IWM (2010) investigates the impacts of the NRLP in their analysis of Scenario H; values in Figs. 5.60 and 5.61 (pgs. 102 and 103) can be considered equivalent to the “change” values in this study for the Ganges tributaries, but for the months of April and August rather than annually. Similarly, Fig 5.53 (pg. 97) is directly comparable to Hardinge Bridge mean monthly discharge in this study. However, not all diversions and water usage considered in this study were included in IWM (2010).*

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**Part III: National Water Development Agency (NWDA) Sources**

The following NWDA documents have been archived and analyzed. Note that dates of publication do not reflect dates of access; all documents were downloaded in 2015 and 2016. In this study it has been assumed that an NWDA document available for access from the main NWDA portal (nwda.gov.in) is still relevant; if a more recent source contradicts the information in the NWDA documents, this has been noted in the database and included only if the source is reliable (e.g., a geotechnical investigation, or a memo or presentation by NWDA officials). Dates of publication by NWDA may not reflect dates of data collection; many reports contain data from surveys and censuses conducted as early as the 1980s. For displaced population estimates, dates of census were used in this study rather than dates of publication. For all river discharge values, date ranges of data collection are specified in the database.

Header gives canal # (this study) followed by NWDA name

**1.1 – 1.5 / Manas-Sankosh-Tista-Ganga**

* In-house bulletin (NWDA, 2013)

**2 / Kosi-Mechi**

* Executive Summary (NWDA, 2009)
* Detailed Project Report (NWDA, 2009)

**6.1-6.2 / Sarda Yamuna**

* Prefeasibility report (NWDA, 2015)

**9.1-9.3b / Parbati Kalisindh Chambal**

* Summary (NWDA, 2005)
* Feasibility Report (NWDA, 2005)

**10 / Ken-Betwa**

* Summary (NWDA, 1995)
* Feasibility Report (NWDA, 1995)
* Updates to Feasibility Report (NWDA, 2009)
* Detailed Project Report Phase I (NWDA, 2011)
* Detailed Project Report Phase II (NWDA, 2013)
* Environmental Impact Assessment and Environmental Management Plan for Phase I (NWDA, 2015)

**16.1-16.2 / Mahanadi (Manibhadra)-Godavari (Dowlaiswaram)**

* Summary (NWDA, 2015)

**17 / Godavari (Polavaram)-Krishna (Vijayawada)**

* Summary (NWDA, 1995)
* Feasibility Report (NWDA, 1995)

**18 / Godavari (Inchampalli) Krishna (Pulichintila)**

* Summary (NWDA, 2005)
* Feasibility Report (NWDA, 2005)

**19 / Godavari (Inchampalli)-Krishna (Nagarjunasagar)**

* Summary (NWDA, 2005)
* Feasibility Report (NWDA, 2005)

**20 / Krishna (Nagarjunasagar)-Pennar (Somasila)**

* Summary (NWDA, 1999)
* Feasibility Report (NWDA, 1999)

**21 / Pennar (Somasila)-Palar-Cauvery (Grand Anicut)**

* Summary (NWDA, 2005)
* Feasibility Report (NWDA, 2005)

**22 / Krishna (Srisailam)-Pennar**

* Summary (NWDA, 1999)
* Feasibility Report (NWDA, 1999)

**23 / Krishna (Almatti)-Pennar**

* Summary (NWDA, 2005)
* Feasibility Report (NWDA, 2005)

**24 / Bedti-Varada**

* Summary (NWDA, 1995)
* Preliminary Feasibility Report (NWDA, 1995)

**25 / Netravati-Hemavati**

* Summary (NWDA, 2005)

**26 / Cauvery (Kattalai)-Vaigai-Gundar**

* Summary (NWDA, 2005)
* Feasibility Report (NWDA, 2005)

**27.1-27.2 / Pamba-Achankovil-Vaippar**

* Summary (NWDA, 1995)
* Feasibility Report (NWDA, 1995)

**28.1-28.4 / Par-Tapi-Narmada**

* Summary (NWDA, 2005)
* Feasibility Report (NWDA, 2005)
* Detailed Project Report (NWDA, 2012)

**29.1-29.2 / Damanganga-Pinjal**

* Feasibility Report (NWDA, 2005)
* Detailed Project Report (Pinjal Dam) (NWDA, 2012)