

## LAHMEYER INTERNATIONAL

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This chapter was sent to Lahmeyer to review for factual errors. The company was not invited to make editorial comments but was given the opportunity to submit a statement responding to the points raised. Lahmeyer declined to respond. The text of the chapter therefore remains as originally sent to the company.

### UPDATES

This chapter was completed on 28<sup>th</sup> February 2003. As with any industry, however, the hydro sector is by no means static: companies get taken over or merge, and their management may decide to withdraw from projects in which they were involved at the time of writing. The authors would recommend the following web sites for updates: <http://www.lahmeyer.de>, [www.irn.org](http://www.irn.org)

Lahmeyer International is among the largest design and consultancy firms in the world working in the field of hydropower. The magazine *Engineering News-Record* listed the company as top international design firm in hydropower plants in both 1999 and 2000.<sup>1</sup> Recent press releases from Lahmeyer International boast that the company is currently working on plans and studies for hydropower plants worldwide with a total installed capacity of more than 17,000 MW. As well as hydropower, the group works in the fields of energy, water resources, transport and project management.

Lahmeyer International's parent company was founded on 30 September 1890 as Kommanditgesellschaft W. Lahmeyer & Co by engineer Wilhelm Lahmeyer and private Frankfurt banking houses.<sup>2</sup> Lahmeyer designed and constructed power plants, electricity transmission lines and power distribution systems in Germany and other European countries. From the outset, Lahmeyer was involved in hydropower design: in 1898, the company designed the 1 MW Sinaia Hydropower plant in Romania.<sup>3</sup>

Lahmeyer International was founded on 2 February 1966 and has worked on projects in over 140 countries, and has ten international offices, five regional offices in Germany and twenty representatives worldwide. Lahmeyer International employs 1,000 people and has more than 10 associated companies in over 40 countries.<sup>4</sup> (In 1999, the company had 12 subsidiaries and

<sup>1</sup> "The Top 5 International Design Firms in Hydro Plants", *Engineering News-Record* web-site: <http://www.enr.com/sourcebk/00ghydro.asp> accessed 20 February 2002.

<sup>2</sup> "Starting point and objectives of the merger", Lahmeyer Aktiengesellschaft web-site: [http://www.lahmeyer.com/historie/c\\_historie\\_e.html](http://www.lahmeyer.com/historie/c_historie_e.html) accessed 5 September 1999.

<sup>3</sup> "Romania One hundred years in operation: Sinaia Hydropower Plant", Lahmeyer International web-site: <http://www.lif.de/world-e/projekte/39e-2.html> accessed 6 September 1999.

<sup>4</sup> "Company Data – Lahmeyer International", Lahmeyer International web-site: <http://www.lahmeyer.de/e/company/structure/data.html> accessed 25 June 2002.

offices and representatives in 85 countries.) In 1998, Lahmeyer International and Hochtief formed Onix Energia in Brazil.<sup>5</sup>

Thirty per cent of Lahmeyer International's projects are in Germany, the rest are abroad. Company turnover in 2000-2001 was 82 million Euro.<sup>6</sup>

Lahmeyer International's ownership changed between 1999-2001. The company's web-site lists two Frankfurt-based companies, DPB Deutsche Planungs- und Beratungsbeteiligungs AG (75.1 %) and RWE Solutions AG (24.9 %) as "associates".

Until recently, Lahmeyer International was owned by Lahmeyer Aktiengesellschaft (AG) (80%), Deutsche Bank (10%) and Dresdner Bank (10%). Lahmeyer AG was established as a holding company on 14 April 1997 through the merger of Lahmeyer AG für Energiewirtschaft with Rheinelektra AG.<sup>7</sup> Between 1923 and 1999, RWE, a German utility company, was the majority shareholder in Lahmeyer AG. In February 1999, RWE announced its intention to buy all the remaining shares in Lahmeyer AG. As part of an overall restructuring of the RWE group, in November 1999 RWE established TESSAG (Technische Systeme and Services AG), through the merger of Lahmeyer AG, Nukem GmbH and other companies.<sup>8</sup> In February 2000, Lahmeyer AG became part of RWE and Lahmeyer AG shares were converted into RWE shares.<sup>9</sup> RWE's Annual Report 2000/01 reports that TESSAG sold Lahmeyer International.<sup>10</sup> In September 2001, TESSAG was renamed as RWE Solutions AG, the company that is now a 24.9 % "associate" of Lahmeyer International.<sup>11</sup>

Dresdner Bank and Deutsche Bank, which until recently owned 20% of Lahmeyer International, both fund dam construction. Dresdner Bank has given loans on the Pangue dam in Chile and the Three Gorges dam in China.

On at least two occasions, Lahmeyer International has worked on projects funded (or potentially funded) by Dresdner or Deutsche Bank. Dresdner was one of the lead banks in phase 1A of the Lesotho Highlands Water Development Project (LHWP) and Lahmeyer International is part of the consortium responsible for the design and supervision of the Mohale tunnel and the Muele dam, part of the LHWP.<sup>12</sup> Deutsche Bank is one of the potential funders of the Nam Theun 2 dam in Laos, a project for which Lahmeyer International produced an alternatives study, in 1997.

In October 1999, Adolf Wannick, head of project development at Lahmeyer International's hydropower division, dismissed any questions of a potential conflict of interest: "The shares

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<sup>5</sup> "Introduction", Onyx Energia web-site: [http://www.onixenergia.com.br/english/company/frm\\_middle.htm](http://www.onixenergia.com.br/english/company/frm_middle.htm) accessed 3 March 2002.

<sup>6</sup> Ibid.

<sup>7</sup> Rheinelektra AG was founded in 1897 with the goal of supplying electricity to south-west Germany. "Starting point and objectives of the merger", op. cit. 2.

<sup>8</sup> "TESSAG builds on experience and competence", RWE press release, 8 November 1999, web-site:

[http://www.rwesolutions.com:80/cgi-bin/pr/medien-anzeige-wirtschaft.cgi?action=Volltext+anzeigen&sequence\\_number=65&sprache=englisch](http://www.rwesolutions.com:80/cgi-bin/pr/medien-anzeige-wirtschaft.cgi?action=Volltext+anzeigen&sequence_number=65&sprache=englisch) accessed 3 March 2002.

<sup>9</sup> "Merger completed between LAHMEYER Aktiengesellschaft and RWE Aktiengesellschaft", RWE press release, 21 February 2000, web-site: [http://www.rwesolutions.com:80/cgi-bin/pr/medien-anzeige-wirtschaft.cgi?action=Volltext+anzeigen&sequence\\_number=54&sprache=englisch](http://www.rwesolutions.com:80/cgi-bin/pr/medien-anzeige-wirtschaft.cgi?action=Volltext+anzeigen&sequence_number=54&sprache=englisch) accessed 3 March 2002.

<sup>10</sup> RWE (2001), *Annual Report 2000/01*, RWE AG, Essen, September 2001, p.94.

<sup>11</sup> "RWE Nukem Coporation", Nukem web-site: <http://www.nukem.com/co/main.html> accessed 3 March 2002.

<sup>12</sup> Dodwell, D. (1992), "Project that posed a real banking challenge – The complexities of financing the Lesotho Highlands water scheme", *Financial Times*, 6 January 1992.

of Dresdner Bank and Deutsche Bank are negligible in our company. What is 10%? Deutsche Bank are silent shareholders here. I don't know where the conflict of interest could be."<sup>13</sup>

As well as hydropower, Lahmeyer International works on renewable energy projects, including wind power, solar energy, biomass, geothermal energy and fuel cells. The company is currently involved in 600 MW of wind park projects.<sup>14</sup>

In the Ukraine, Lahmeyer International has the job of decommissioning the Chernobyl nuclear power plant and is simultaneously working on a master plan for the completion of three nuclear power plants there.

Several staff from Lahmeyer International have taken part in the World Bank's Staff Exchange Programme – allowing them an insider's view of how the Bank works, as well as allowing them to get to know Bank staff personally while working there. Heinz Pape, a Lahmeyer International employee explained, "It was a very interesting experience to work on the other side of the table, i.e. for a donor. I nowadays benefit from the various contacts, which I have in the Bank, if I want to obtain information on certain issues. And Lahmeyer now knows better how the Bank works."<sup>15</sup>

Lahmeyer International is a Registered Company with the World Bank's Prototype Carbon Fund, which aims to "demonstrate how project-based emissions transactions can mitigate climate change".<sup>16</sup> In Uganda, Lahmeyer International produced a report which attempted to calculate how much CO<sub>2</sub> would be emitted by the Bujagali dam – a project that the World Bank is funding. The calculations have been challenged by non-governmental organisations (see below and section on Skanska).

Lahmeyer International has been involved with a number of controversial dam projects. Yet, when Adolf Wannick was asked about his company's involvement in Arun III (Nepal), Bakun (Malaysia), Yacyretá (Argentina), Nam Theun 2 (Laos) and Chixoy (Guatemala), he said: "Lahmeyer has been involved and this is history, because all these projects are either finished or given up, so it's not worthwhile to speak about these dams."<sup>17</sup>

When asked whether Lahmeyer International has a specific ethical policy, Wannick said: "Look, our company has to take care of . . . 800 employees. We are not politicians, and we have to look for work for these employees."<sup>18</sup>

### **Lahmeyer and the World Commission on Dams**

Lahmeyer International provided funding for the World Commission on Dams.<sup>19</sup>

Engelbert Oud of Lahmeyer International was an advisor to the Commission Secretariat. Oud has written several articles in praise of hydropower. For example, in "Global Warming: A

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<sup>13</sup> Wannick, A. (1999), Adolf Wannick, head of project development, Lahmeyer International, hydropower and water resources division, interview with Chris Lang, 12 October 1999.

<sup>14</sup> "Lahmeyer International GmbH", Sovereign Publications web-site: <http://www.sovereign-publications.com/lahmeyer.htm> accessed 20 February 2002.

<sup>15</sup> Pape, H. (2002), "Re: Staff Exchange Programme", e-mail from Heinz Pape to Chris Lang, 23 February 2002.

<sup>16</sup> "Prototype Carbon Fund", World Bank web-site: <http://www.prototypecarbonfund.org> accessed 20 February 2002.

<sup>17</sup> Wannick, A. (1999), op. cit. 13.

<sup>18</sup> Ibid.

<sup>19</sup> WCD (2000), *Dams and Development: A New Framework for Decision-Making*, The report of the World Commission on Dams, Earthscan, London, p. xxi.

Changing Climate for Hydro”,<sup>20</sup> he argues that Northern-based utilities should get “CO<sub>2</sub> credits” for building dams (or establishing plantations) in the South, thus avoiding the need to reduce CO<sub>2</sub> emissions at home.

In his article, “Hydropower in Lao PDR”,<sup>21</sup> Oud extols the potential of building large dams in Laos but makes no mention of any impacts on local populations. In fact, the only hint in the article that there might be people actually living in Laos (other than citing the total population figure) is a reference to the 60,000 people who would be “resettled” if the Pa Mong dam were constructed, a project that was shelved in the mid-1970s.

Oud sees himself as a “neutral advisor” and says: “I don’t consider myself a promoter of hydropower . . . I am only interested in level playing field comparison of options which remains a complex and difficult task.”<sup>22</sup> After working on the World Commission on Dams, Oud took up a new post – with the Nam Theun 2 Electricity Consortium, the developers of the proposed Nam Theun 2 hydropower dam in Laos.

When Wannick was questioned about the World Commission on Dams, he first confused it with the industry’s global lobbying body, International Commission on Large Dams (ICOLD). On the WCD, he said: “This is something new. But frankly I have no opinion, I cannot give you comments, I do not know this organisation. I know ICOLD, and this is the most knowledgeable institution, I would say in this context . . . ICOLD is playing a very important role, but this World Commission, I cannot comment, because I do not know much about this.”<sup>23</sup>

## **LAHMEYER INTERNATIONAL AND DAMS**

### **YACYRETÁ, ARGENTINA and PARAGUAY**

Lahmeyer International is the second company in CIDY, the ten-company consortium responsible for engineering and construction supervision on the 3,200 MW Yacyretá dam<sup>24</sup> [see sections on Impregilo and Voith Siemens]. According to a September 2001 report by the Inter-American Development Bank (co-funder of the dam with the World Bank), twelve years after the planned completion date, the reservoir was still not full and the turbines were running at only two-thirds capacity. Because the turbines were designed to operate with a larger volume of water, the turbines “vibrate significantly, producing minor damage that could deteriorate significantly.” Further, the report notes, “the upper sections of the reservoir’s clay bed is [*sic*] drying out. This could eventually lead to cracking and leakage when the reservoir is filled.”<sup>25</sup>

The World Bank has given the Yacyretá project as a whole an “unsatisfactory” rating.<sup>26</sup> The Inter-American Bank reports: “Speculation, disquiet, and social instability have increased in

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<sup>20</sup> Oud, E. (1993), “Global warming: a changing climate for hydro”, *Water Power and Dam Construction*, May 1993, pp. 20-23.

<sup>21</sup> Oud, E. and Crighton, P. (1993), “Hydropower in Lao PDR”, *Water Power and Dam Construction*, April 1993, pp. 38-41.

<sup>22</sup> Oud, E. (1999), “Re: Lahmeyer and WCD”, E-mail from Engelbert Oud to Chris Lang. 19 October 1999.

<sup>23</sup> Wannick, A. (1999), op. cit. 13.

<sup>24</sup> International Rivers Network (1997), Letter to the Science Technology and Environment Organization, Laos, International Rivers Network, California, January 1997.

<sup>25</sup> “Management’s status report on the Yacyreta Hydroelectric project (Loan 760/OC-RG)”, document of the Inter-American Development Bank, 12 September 2001, p.2.

<sup>26</sup> Ibid.

the project area, generating public outcries for compensation, and even demonstrations in front of EBY offices, encampments of ‘affected community members’ on both sides [i.e. Brazil and Paraguay], and traffic stoppages on the Paraguayan side of the international bridge between Posadas and Encarnación.”<sup>27</sup>

### **KINDA, BURMA**

Lahmeyer International was involved in the 56 MW Kinda dam completed in 1988.

According to Adolf Wannick:

“We did a successful project in Burma, which as I understand it, has guaranteed the production of energy for this country during very critical periods. At that time, there was a military government, but there were no human rights issues as they came up with Aung San Suu Kyi.”<sup>28</sup>

The dam was part funded by the World Bank. Consultants working on an Asian Development Bank report in 2000 reported that the World Bank did not allow them access to Staff Appraisal Reports or Operations Evaluation Impact Studies on the Kinda dam.<sup>29</sup>

### **TA SARNG, BURMA**

In October 1999, Adolf Wannick said that Lahmeyer had no projects in Burma other than the Kinda dam: “Burma, we are not under temptations in this way, let us say, because there is nothing.”<sup>30</sup> In fact, in April 1998, Lahmeyer International completed the pre-feasibility study for the \$3.5 billion, 3,300 MW Ta Sarng dam in Shan State, north-east Burma. The developer is the Thai company, GMS Power, which is also involved in the Theun Hinboun dam in Laos<sup>31</sup> [see sections on Electrowatt-Ekono and Statkraft].

The 188 metre-high dam would be the first on the 2,400 kilometre-long mainstream of the Salween river. The reservoir behind the dam would stretch 230 kilometres along the Salween river, flooding at least 640 square kilometres. Three-quarters of the electricity generated would be exported to Thailand, and, although the project developers deny it, water diversion from Burma to Thailand is also a possibility.<sup>32</sup>

The International Labour Organisation (ILO) reported in 1998, and again in 2000, that the Burmese military dictatorship commonly uses forced labour in infrastructure projects. One of the projects on which the ILO documented forced labour was the Nam Wok hydropower dam, completed in 1994, also in Shan State.<sup>33</sup> Throughout 1998 (the year that Lahmeyer

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<sup>27</sup> Ibid, p. 9.

<sup>28</sup> Wannick, A. (1999), op. cit. 13.

<sup>29</sup> “ADB RETA 5783: Strategic Environmental Framework for the Greater Mekong Subregion (SEF Project)”, Interim Report, Stockholm Environment Institute, June 2000.

<sup>30</sup> Wannick, A. (1999), op. cit. 13.

<sup>31</sup> GMS Power is part of the Bangkok-based real estate and infrastructure development company, MDX Group. See Adams, C. (2001) “Engineering profits: The MDX Group of Companies”, *Watershed*, Vol. 7, No. 2, November 2001 - February 2002, pp. 54-58.

<sup>32</sup> Moe, C. (2000), “From Scorched Earth to Flooded Earth: The General’s Dam On Burma’s Salween River”, Salween Watch and Norwegian Burma Council, Submission to the World Commission on Dams, 31 March 2000. Web-site: <http://www.asiasource.org/asip/salween.cfm> accessed 20 February 2002.

<sup>33</sup> “Forced Labour in Myanmar (Burma): Report of the Commission of Inquiry appointed under article 26 of the Constitution of the International Labour Organization to examine the observance by Myanmar of the Forced Labour Convention, 1930 (No.29)”, International Labour Organization, Geneva, 2 July 1998; and “Second Report of the Director-General to the members of the Governing Body on measures taken by the Government of Myanmar following the recommendations of the Commission of Inquiry established to examine its observance of the Forced Labour Convention, 1930 (No. 29)”, International Labour Organization, Geneva 25 February 2000 cited in Moe (2000), op. cit. 32.

International completed its pre-feasibility study), Army battalions forced villagers to work for periods of up to two weeks splitting rocks near the Ta Sarnng dam site.<sup>34</sup>

Since March 1996, the Burmese military regime has relocated more than 300,000 people, at gunpoint, from 1,400 villages in the central region of Shan State.<sup>35</sup> In November 1999, *Watershed* magazine reported an interview with a villager, who had been forcibly evicted from the proposed reservoir area. When asked how he would feel about his village being underwater, he replied, "I can't express what I feel. It would be worse than the death of my mother or father."<sup>36</sup>

People resettled from the area have no possibility of compensation from the military regime. Many have fled to Thailand to escape what the US Department of Labor describes as "life-threatening" conditions in relocation camps.<sup>37</sup> The army has been systematically killing villagers caught outside the relocation sites.<sup>38</sup>

### **ERTAN, CHINA**

Lahmeyer International provided consultancy services on the 3,300 MW Ertan dam on the Yalong river, a tributary of the Yangtze in Sichuan province. Hochtief, the German construction company, was part of the consortium that built the underground works for the dam.<sup>39</sup> At the time, both Hochtief and Lahmeyer International were part of the RWE group. Ertan was constructed between 1991 and 1999. 35,000 people were evicted to make way for the reservoir.

Electricité de France also acted as consultants on the project. VA TECH HYDRO Vevey supplied governors for the power plant under subcontract to GE HYDRO. Siemens provided a Chinese language version of its plant management system for Ertan. Impregilo and Lyonnaise des Eaux won joint venture contracts worth approximately \$760 million to build the dam.

The project caused major resettlement problems and has experienced financial difficulties due to the difficulties of selling the electricity that is generated. [For further details, *see* section on Impregilo.]

### **XIAOLANGDI, CHINA**

Lahmeyer International worked on the 1,800 MW Xiaolangdi dam on the Yellow river, 45 kilometres north of Louyang in Henan Province.<sup>40</sup> To make way for the reservoir, 170,000 people were evicted from their homes: resettlement has proved problematic. Impregilo is the lead partner in the Yellow River Contractors joint venture which is building the dam. [For further details, *see* section on Impregilo].

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<sup>34</sup> "2000 Update on Forced Labor and Forced Relocations", US Department of Labor web-site:

<http://www.dol.gov/dol/ilab/public/media/reports/ofr/burma/forced.htm> cited in Moe, C. (2000) op. cit. 32.

<sup>35</sup> "Dispossessed: Forced relocation and extrajudicial killings in Shan State", *Watershed*, Vol. 4, No. 1, March - June 1998, pp. 40-46.

<sup>36</sup> "A dam for Burma's generals", *Watershed*, Vol. 5, No. 2, November 1999 - February 2000, p. 44.

<sup>37</sup> "2000 Update on Forced Labor and Forced Relocations", op. cit. 34.

<sup>38</sup> "Dispossessed: Forced Relocation and Extrajudicial Killings in Shan State", Shan Human Rights Foundation, April 1998.

<sup>39</sup> "Ertan hydropower plant, China", web-site:

<http://www.power-technology.com/projects/ertan> accessed 4 December 2001.

<sup>40</sup> "David L. Kern, Curriculum Vitae", web-site:

[http://www.constructiongigs.com/resumes/htmlpages/kern\\_david031601.html](http://www.constructiongigs.com/resumes/htmlpages/kern_david031601.html) accessed 20 February 2002.

## **NAGA HAMMADI, EGYPT**

In 1996, Lahmeyer International produced a feasibility study for a dam to replace the existing Naga Hammadi dam, built in the 1920s on the River Nile, about 360 kilometres downstream of the Aswan dam. Lahmeyer International's proposed dam site for the New Naga Hammadi dam was 3.5 kilometres downstream of the existing Naga Hammadi dam. Lahmeyer International was also responsible for hydraulic model tests, tender design, tender documents, tender evaluation, construction design, and supervision of construction and installation.<sup>41</sup> Germany's Kreditanstalt für Wiederaufbau and the European Investment Bank are the principle funders of the \$378 million project.

In order for the dam to generate 64 MW, the water level in the river would need to be increased. According to Doug Cross, who at the time worked for Global Impacts Ltd., the company hired by Lahmeyer International to carry out an Environmental Impact Assessment for the project, this would also raise the ground water level, leading to good quality agricultural land becoming either waterlogged or underwater. In addition, many village wells would become shallower. Cross pointed out that shallower wells would probably lead to a higher incidence of wells contaminated with typhoid. Further, under Egyptian law, both the project developers and the contractors could be held personally liable for any deaths caused by increased typhoid related to the project.<sup>42</sup>

A member of a Panel of Experts hired to review the project told Brian Spooner of Global Impacts that Lahmeyer International had re-written the EIA, to exclude what they considered irrelevant, to incorporate results from later groundwater assessments and to revise almost all the predicted impact figures downwards.<sup>43</sup>

Cross states that the final design simply replaced the original barrage, with no increase in water level and no hydropower,<sup>44</sup> but Winfrid Guth, Lahmeyer's project manager, told *Engineering News-Record* in May 2001 that the new dam would raise water by four to eight metres for irrigation and drive a 64 MW hydroelectric plant.<sup>45</sup> In 2001, VA TECH HYDRO won an order to supply turbines at the plant.<sup>46</sup>

## **TOSHKHA, EGYPT**

In 1998, the Egyptian government appointed Lahmeyer International to plan the Toshka pumping station – to extract water from Lake Nasser, the reservoir behind the High Aswan dam. The water is to be used to irrigate 400,000 hectares of what is currently part of the Nubian desert. According to the plans, what will be the world's largest pumping station is to pump 350 cubic metres per second of water from Lake Nasser into the new 200 kilometre-long Sheikh Zayed Canal. Sogreah won the contract for the construction supervision of the pumping station and the design of the canal [*see* section on Sogreah]. The project is due to be completed in 2002.

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<sup>41</sup> "Low head plants Egypt: Naga Hammadi", Lahmeyer International web-site:

[http://www2.lif.de/english/geschaeftsfelder/naga\\_hamadi.html](http://www2.lif.de/english/geschaeftsfelder/naga_hamadi.html) accessed 20 February 2002.

<sup>42</sup> "The Naga Hammadi Barrage – go directly to jail!", Doug Cross web-site: <http://www.doublef.co.uk/cockups.htm> accessed 20 February 2002.

<sup>43</sup> Cross (1999), "LI in Egypt", E-mail from Doug Cross to Chris Lang, 15 December 1999.

<sup>44</sup> "The Naga Hammadi Barrage – go directly to jail!", op. cit. 42.

<sup>45</sup> Reina, P. (2001) "Huge Projects Under Way To Bring Water To Egyptian Desert", *Engineering News-Record*, web-site: [http://www.enr.com/news/enrpwr\\_50101.asp](http://www.enr.com/news/enrpwr_50101.asp) accessed 20 February 2002.

<sup>46</sup> "Worldwide success of VA Tech Hydro", VA Tech Hydro Press Release, 29 January 2002, web-site: [http://www.escherwysspropellers.com/view.php3?f\\_id=7326&LNG=EN](http://www.escherwysspropellers.com/view.php3?f_id=7326&LNG=EN) accessed 7 June 2002.

The project is designed to attract large-scale agribusiness rather than small-scale farmers. Before the Egyptian government announced its land allocation plan in the proposed irrigated area, almost 80% of the total area was allocated to Saudi Prince Al-Walid Bin Talal Bin Abdul-Aziz Al-Saud. Prince Al-Walid plans to establish an export-oriented horticultural produce operation. The Prince commissioned international accountants and consultants Arthur Andersen to assess the viability of his plans. Fiona Elgin of Arthur Andersen told the *Al-Ahram* newspaper that the prince “loves the project and is very passionate about it.” However, she added, “Any small investor getting involved there would probably find it daunting.” Fayek Abdel-Sayed, the general supervisor of the Toshka project at the Egyptian Ministry of Public Works, pointed out that people moving to the area would have to dig their own subsidiary canals to allow the water to reach their land. They will also have to build their own irrigation systems, power stations, houses, and anything else that they require.<sup>47</sup>

### **AWASH III, ETHIOPIA**

Lahmeyer International was involved in the 40 MW Awash III dam. Electrowatt Engineering provided consulting services on the dam. The World Bank-funded Awash valley programme destroyed much of the forest and grazing lands on which 150,000 Afar pastoralists depended. The subsequent conversion of most of the irrigable land to cotton and sugar cane plantations led to the displacement of 20,000 people who became dependent on food relief. The Afar came to view the development project as “punishment from God”.<sup>48</sup>

### **CHIXOY, GUATEMALA**

Lahmeyer led a three-company consortium called LAMI which planned, designed and supervised construction for Guatemala’s 300 MW Chixoy dam.<sup>49</sup> The dam was funded with two loans from the World Bank, the first in 1978 of \$72 million, and a second for \$44.6 million in 1985.<sup>50</sup> Around 3,400 indigenous people lost their homes and lands to the reservoir, and many lost their lives. In 1982, state-backed death squads murdered hundreds of villagers living in the proposed reservoir area. Many of the survivors believed that the National Institute of Electrification (INDE), Guatemala’s state-owned electricity utility, encouraged the violence to clear the reservoir area. In their feasibility study for the dam, LAMI stated: “In the tract of the study . . . there is almost no population”<sup>51</sup> [see section on Impregilo].

### **CHULAC, GUATEMALA**

Lahmeyer, as part of a slightly restructured LAMI, was re-hired for the \$1,250 million, 450 MW Chulac dam.<sup>52</sup> Work began in 1981 before the feasibility studies were complete. Hochtief AG won the construction contract, and \$137 million was spent on two diversion tunnels, access roads and camps. Work was stopped in 1982 when it was discovered that the rock was too weak to support the dam. Roberto Balsells, former president of the National Institute of Electrification (INDE), Guatemala’s state-owned electricity utility, says that the

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<sup>47</sup> Niveen Wahish (1998) “Toshka turns millennial green”, *Al-Ahram Weekly*, No.392, 27 August - 2 September 1998, website: <http://www.ahram.org.eg/weekly/1998/392/ec1.htm> accessed 20 February 2002.

<sup>48</sup> Adams, P. (1986), Testimony presented by Pat Adams of Energy Probe to the US Senate Sub-Committee on Foreign Operations, 1 May 1986.

Said, A. (1997), “Resource use conflict in the Middle Awash Valley of Ethiopia: The Crisis of Afar Pastoralism”, in Hogg, R. (1997) *Pastoralists Ethnicity and the State in Ethiopia*, Institute for African Alternatives/HAAN Publishing, London.

<sup>49</sup> International Rivers Network, Letter to the Science Technology and Environment Organization, Laos, op.cit. 24.

<sup>50</sup> “A People Dammed: The Impact of the World Bank Chixoy Hydroelectric Project in Guatemala”, Witness for Peace, Washington DC, 1995.

<sup>51</sup> McCully, P. (1996), *Silenced Rivers: The Ecology and Politics of Large Dams*, Zed Books, London.

<sup>52</sup> Davidson, M. (1987), “Hydro frustration in Guatemala”, Manuscript, Guatemala City, 18 June 1987, p. 3.

opportunity to embezzle funds was the main reason the Chulac dam project was started. The project began without the approval of INDE under the dictatorship of General Romeo Lucas Garcia.<sup>53</sup>

### **NAM LEUK, LAOS**

In 1992, in association with Beca Worley International, a New Zealand consulting firm, Lahmeyer International produced an environmental impact assessment (EIA) for the Nam Leuk dam.<sup>54</sup> The EIA was criticised in an anonymous report produced for the Lao Ministry of Forestry, which said that it “does not address the potentially serious impacts of the project” and described the EIA as “substandard and inaccurate in a number of aspects”.<sup>55</sup> In 1995, the French consulting engineering company, Sogreah, won the contract to produce a second EIA<sup>56</sup> [see section on Sogreah]. Despite criticisms of Sogreah’s report, the Asian Development Bank agreed, in September 1996, to finance the project with a \$52 million loan.<sup>57</sup>

### **NAM MANG 3, LAOS**

In 1992, Lahmeyer International completed a pre-feasibility study on the Nam Mang 3 dam with funding from the Asian Development Bank.<sup>58</sup> Sogreah carried out a feasibility study on the dam. The dam is currently under construction with funding through a loan from the Chinese Ex-Im Bank. The dam is being built by China International Water and Electric Corporation, the company responsible for building the Nam Leuk dam [see Nam Leuk entry above and section on Sogreah]. Observers in Laos claim that the construction contract did not go out to tender and appeared to be “insider deal”.

The reservoir behind the dam will submerge all the available paddy land in the area and flood three villages with 100 households from the Hmong ethnic group. Neither an environmental impact study nor a resettlement plan was produced before construction work commenced.

### **NAM THEUN 2, LAOS**

Lahmeyer International worked with Beca Worley International, a New Zealand consulting firm (see entry on Nam Leuk above), on the Nam Theun 2 Study of Alternatives for the World Bank.<sup>59</sup> The dam is proposed on the Theun river, the fourth largest tributary of the Mekong river, in central Laos. The reservoir would flood 450 square kilometres of the Nakai Plateau and result in the eviction of 4,500 people. Despite the fact that the dam may never be built, the Lao military-run logging company, BPKP, has since the early 1990s been logging the proposed reservoir area.<sup>60</sup>

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<sup>53</sup> Ibid, p. 3-4.

<sup>54</sup> “Nam Leuk Hydropower Development Project – Feasibility Study Environmental Impact Assessment Final Report (TA No. 1221-LAO)”, Electricité du Laos, Beca Worley International (New Zealand), Lahmeyer International (Germany), Asian Development Bank (Manila), January 1992.

<sup>55</sup> “Reappraisal of the Adequacy of the EIA Report for the Nam Leuk Hydropower Development Project. Conclusions of a Consultancy Report to the Protected Areas and Watershed Management Division of the Ministry of Forestry, Lao PDR”, Anonymous manuscript, 16 November 1994.

<sup>56</sup> “Power Struggle: The impacts of hydro-development in Laos”, International Rivers Network, California. February 1999, p. 23.

<sup>57</sup> “Dam wins out over protest by environmentalists”, *Engineering News Record*, Vol. 237, No. 13, 23 September 1996, p. 5.

<sup>58</sup> Oud, E. and Crighton, P. (1993), op. cit. 21, p. 41.

<sup>59</sup> “Hydropower and Water Resources Selected Projects 1995-1997”, Lahmeyer International web-site: <http://www.lif.de/world-e/projgw.html> accessed 16 June 1999.

<sup>60</sup> “Power Struggle”, op. cit. 56, p. 34.

The company developing the dam, Nam Theun 2 Electricity Consortium (NTEC) consists of Electricité de France (35%), the government of Laos (25%) Electricity Generating Plc (25%) and Italian-Thai Development (15%) [see section on Electricité de France].

The developers are looking to the World Bank to provide a \$100 million “partial risk” guarantee, without which the project is unlikely to get commercial funding. The World Bank, in turn, will not make a decision on whether to provide the guarantee until a power purchase agreement (PPA) is settled between the government of Laos, the project developers, the Thai government and the Electricity Generating Authority of Thailand (EGAT). In February 2002, EGAT signed a “preliminary power purchase agreement” with the project developers.<sup>61</sup> In late 2002, the Government of Laos signed a \$2 billion concession agreement with NTEC, under which NTEC was granted a concession to build, own and operate the proposed dam for 25 years.<sup>62</sup>

During negotiations in November 1998, NTEC raised the proposed output of the dam from 681 MW to 900 MW, thus making the previous economic and alternatives studies at least in part redundant. The currently proposed output is 1080 MW.

Part of Lahmeyer International and Beca Worley International’s 1997 Study of Alternatives involved a “public participation workshop”, although neither consultant had any previous experience in such work. Bert Oud<sup>63</sup> of Lahmeyer International was the project manager for the study. He described the study as “innovative in the terms of its holistic approach and because of the public workshops with stakeholders.”<sup>64</sup>

In fact, the contract allowed the consultants considerable power in the decision-making process. According to the terms of reference: “The first step would be to identify key stakeholders at the local/regional and national levels and then decide which stakeholders would be consulted at which step in the process.”<sup>65</sup> Having hand-picked the “stakeholders”, the consultants announced the “public participation workshops” only 12 days before they took place. The consultants wrote the agenda for the meetings and structured the discussions and the working groups within the workshops. They decided both the participants’ fields of expertise and the major relevant disciplines. They fed the “output” from their “stakeholders” into a Lahmeyer International-designed software package, called MOSES (Multi-Objective Scenario Evaluation). From this exercise, they concluded the dam should go ahead. The invitations sent to “stakeholders” asking them to take part in the “public participation workshop” did not make clear that one of the potential commercial funders of the Nam Theun 2 project is Deutsche Bank, nor that at the time Deutsche Bank owned 10% of shares in Lahmeyer International.

In a submission to the World Commission on Dams, Shalmali Guttal of Focus on the Global South, a Bangkok-based NGO, commented on Lahmeyer International and Beca Worley International’s Study of Alternatives:

“The Lahmeyer Alternatives study focussed more on how the country could meet its commitments to an agreement to provide electricity to Thailand, rather than on other genuine options by which water and other resources in the area could be utilised to provide revenues and alternative livelihoods. What would happen if the dam were not built at all? What if a

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<sup>61</sup> Yuthana Praiwan (2002), “Egat seals power purchase deal”, *Bangkok Post*, 6 February 2002.

<sup>62</sup> “Laos signs Nam Theun dam deal”, *International Water Power & Dam Construction*, November 2002, p.2.

<sup>63</sup> Oud took leave from Lahmeyer International in 1999 to work as a consultant at the secretariat of the World Commission on Dams. From there he went to work for the Nam Theun 2 project developers, NTEC.

<sup>64</sup> Oud, E, (1999), op. cit. 22.

<sup>65</sup> “Study of Alternatives Terms of Reference”, Lahmeyer International and Beca Worley International, 1996, p. 11.

smaller dam was built, or a dam with a different design? How could the resources of the area be managed to balance watershed protection and enhance livelihoods without resulting in the types of impacts expected from a project as large as the Nam Theun 2? How would reduced revenues from such alternatives compare with the reduced costs of mitigating the anticipated impacts of the proposed project? The public, and in particular directly affected communities were not able to assess options to the project since they were simply not presented.”<sup>66</sup>

### **LESOTHO HIGHLANDS WATER DEVELOPMENT PROJECT, LESOTHO**

Lahmeyer International has played a key role in the Lesotho Highlands Water Development Project (LHWP). Lahmeyer International was part of the Lahmeyer Macdonald consortium, with Mott Macdonald (UK) and Consult 4 (South Africa), which produced a feasibility study in 1986 for the LHWP. According to Doug Cross, who then worked with Global Impacts Ltd., a consulting company that was employed by Lahmeyer International in Lesotho, the feasibility study ignored “trans-boundary implications” and “the potential interests of Namibia”.<sup>67</sup> Further, the study “was completed without adequate environmental consultation and analysis”.<sup>68</sup>

Lahmeyer International carried out an Initial Environmental Impact Assessment (IEIA) of the 33 kilometre-long, \$125 million Mohale tunnel, which connects the Mohale and Katse reservoirs.<sup>69</sup> Lahmeyer International contracted Global Impacts Ltd. to carry out the IEIA for the Mohale Tunnel. The Mohale Tunnel allows water to be transferred from the Orange River to the Vaal River, yet consideration of the downstream impacts on both river systems was expressly excluded from study in the IEIA. When Doug Cross of Global Impacts Ltd. arrived in Lesotho in June 1995, he was told that his study “should not consider downstream impacts beyond the borders of Lesotho.”<sup>70</sup> Cross subsequently stated, “LI [Lahmeyer International] Project Managers made it impossible for me to work according to the professional requirements of the internationally accepted code of practice for carrying out full-scale environmental impact assessments”.<sup>71</sup>

Cross’ work included an analysis of the project against the World Bank’s policies and guidelines. In his draft IEIA of January 1996, Cross concluded that the “Environmental assessments at preceding stages of the development of the Project have been inadequate, and fail to comply with the requirements of accepted World Bank methodologies enshrined in Operational Directive 4.01 [Environmental Assessment]”. Lahmeyer International’s Project Manager Geoffrey Featherstone, responded by ordering Cross to stop addressing issues outside his Terms of Reference. The ToR, however, explicitly stated that the IEIA should be carried out to “internationally recognised procedures” and that the IEIA should be founded on existing data from previous studies. Featherstone also ordered Cross not to speak to anyone outside the project team (including members of the Lesotho Highlands Water Authority and the World Bank’s Panel of Experts) without his permission.

Lahmeyer International effectively terminated the contract with Global Impacts Ltd after the inception phase, by refusing to obtain permission for Cross to return to Lesotho to complete the study. Lahmeyer International then re-wrote Cross’ draft EIA and threatened him and

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<sup>66</sup> Guttal, S. (2000), Public Consultation and Participation in the Nam Theun 2 Hydroelectric Project in the Lao PDR, Submission to the World Commission on Dams, Southeast Asia Regional Consultation, Hanoi, 26-27 February 2000.

<sup>67</sup> Cross, D. (1999), “Re: Lahmeyer”, E-mail from Doug Cross to Chris Lang, 9 December 1999.

<sup>68</sup> Cross, D. (1996), Draft Inception Report, Mohale Tunnel Initial Environmental Impact Assessment, Phase 1B, Lesotho Highlands Water Development Project, January 1996.

<sup>69</sup> Doug Cross, Curriculum Vitae, <http://www.doublef.co.uk/texts/cvs/publist.htm> accessed 20 February 2002.

<sup>70</sup> Cross (1999), op. cit. 67.

<sup>71</sup> Ibid.

Global Impacts Ltd with legal action, for allegedly “bringing the Company’s reputation into disrepute”.<sup>72</sup>

Lahmeyer Macdonald subsequently won the contract to design and supervise construction of the Mohale tunnel. The tunnel was partly funded by the World Bank.<sup>73</sup>

The Lahmeyer Macdonald consortium carried out an environmental audit for the 72 MW Muela dam in 1997, another part of the LHWP. Among the project’s financiers are Dresdner Bank (which at the time owned 10% of Lahmeyer International) and Hermes, the German export credit agency.

Lahmeyer International was one of 12 multinational companies involved with the project to be charged with corruption in November 1999. The company was alleged to have paid \$8,674 to the project’s former head, Masupha Sole. Dr. J. Zimmerman, head of the hydropower section of Lahmeyer International, denied the allegations.

In May 2002, Judge Brendon Cullinan found Masupha Sole guilty on 13 counts of accepting bribes from a number of named companies, including Lahmeyer. The court ruled that Lahmeyer and the Lahmeyer MacDonald Consortium had paid “FFR 108,599.10, SAR 50,000.00 and USD 85,053.41” to Sole. In his judgment, Judge Cullinan stated: “Suffice it to say there cannot possibly be any doubt as to the purpose of the payments by the intermediaries to the accused: beyond reasonable doubt they were bribes.”<sup>7475</sup>

In August 2002, Lahmeyer went on trial, charged with paying bribes. A judgement is expected in 2003.

Lahmeyer was the second company to be tried. The first, Acres International, was convicted in August 2002 Acres’ defense – similar to that being argued by Lahmeyer – was that the company was not responsible for the payments made to Mr Sole, since these were made by an intermediary, Mr. Bam, with whom the company had a “representation agreement.” Such agreements, according to Acres, are common practice for companies competing for business internationally. The agreement generally employs a “local” person to safeguard and promote the interests of the company concerned in negotiations. In some cases, the agreement stipulates that money will only be paid if the company secures a contract.

In his verdict, Judge Lehohla, dismissed this defence, stating that the representation agreement was a “sham”.<sup>76</sup> Mr Bam could not be called a “local” agent since, at the time, he was employed in Botswana, thousands of miles from Lesotho. The Judge also ruled that there was no evidence that Bam had provided any service to Acres. The inescapable inference was that the representation agreement was a conduit for bribes – and that Acres knew this to be the case.

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<sup>72</sup> Ibid.

<sup>73</sup> “Mohale tunnel design contract is awarded”, *Hydropower and Dams*, Issue One, 1996: 8.

<sup>74</sup> Rex v Masupha Ephraim Sole, Judgment by the Hon. Mr Acting Justice B.P. Cullinan, 20<sup>th</sup> May 2002, High Court of Lesotho, CRI/T/111/99, p.118. Judge Cullinan concluded: “I am satisfied beyond reasonable doubt, as the only reasonable inference, that, in the eleven counts of bribery involved, the accused and the relevant Consultant/Contractor in each count, unlawfully, intentionally and corruptly entered into a corrupt agreement, whereby the accused agreed to further the private interests of that Consultant/Contractor in its involvement with the LHWP (Lesotho Highlands Water Project), pursuant to which agreement the Consultant/Contractor paid the accused the particular sum of money which I have previously specified under each count.” See: Rex vs Masupha Ephraim Sole, Judgement, 20<sup>th</sup> May 2002, High Court of Lesotho, CRI/T/111/99, pp.118-119.

<sup>75</sup> “Ex-Highlands CE guilty of bribery”, South Africa Press Association, 20 May 2002.

<sup>76</sup> “Rex vs Acres International Ltd.”, Judgement delivered by Hon. Mr. Justice M.L. Lehohla, 13 September 2002, Maseru, Lesotho.

Acres has appealed the conviction, for which it was fined 22 million rand (\$2.2 million). Payment of the fine was subsequently suspended, pending the outcome of Acres' appeal.<sup>77</sup>

### **BAKUN, MALAYSIA**

Lahmeyer International was the lead consultant for the planned 2,400 MW Bakun dam on the Balui river in Sarawak. In 1979, the German government offered technical assistance to Malaysia "resulting in the formation of the SAMA engineering consortium under the leadership of Lahmeyer International".<sup>78</sup> The company also played a lead role in drawing up the construction contract and supervising construction on the diversion tunnels.

Lahmeyer International has proved itself unwilling to engage in debate with critics of its work on Bakun. In 1995, Dr. Weilou Wang, a regional planner at Dortmund University in Germany, questioned the assumptions made in SAMA's feasibility studies on the Bakun dam. This prompted two of Lahmeyer International's directors, Dr. J. Zimmerman and R. Wigand, to write to Dr. Wang's head of department, accusing Wang of making statements that were "false and without foundation". They also said Wang had "not only tarnished the reputation of our company, but also had given a bad name to German engineering science and to his university."<sup>79</sup>

International opposition to the dam, coupled with investor fears as to its high financial risks, led to the dam being cancelled in 1997. However, the Malaysian government has now revived the project, although the original planned underwater cable allowing electricity from the dam to be exported from Sarawak to peninsular Malaysia would not be built.<sup>80</sup> The revived project, which was announced in 2001, is opposed by local people. Borneo Research Institute programme officer Raymond Apin told journalists that the project is neither economically viable nor safe for the local community.<sup>81</sup>

### **FOUM-GLEITA, MAURITANIA**

Lahmeyer International was consulting engineer on the Foum-Gleita irrigation dam on the Gorgol river.<sup>82</sup> The dam was funded in part with a loan from the World Bank and completed in 1984. In a 1997 report on resettlement caused by development projects, Michael Cernea of the World Bank, stated, "At the Foum-Gleita irrigation project in Mauritania, only 200 out of the 881 displaced families successfully reconstructed their housing; the rest lived precariously for two years or longer in tents or under tarpaulins." He added that schistosomiasis had increased as a result of the project, by more than anticipated, "reaching 70% among school children", and that "farmers' health also worsened from contaminated drinking water and agrochemical intoxication". Cernea also reported that since the dam was built, paddy-rice mono-cropping has replaced multiple cropping and animal husbandry, villagers' diets and income from cash crops has deteriorated.<sup>83</sup>

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<sup>77</sup> "Court suspends bribery fine", SAPA (SA), 11/12/2002.

<sup>78</sup> Failer, E. and M.D. Abong (1995), "The 2400MW Bakun hydroelectric project", *International Water Power and Dam Construction*, November 1995: 24-28.

<sup>79</sup> McCully, P. (1996), op. cit. 51, p. 265.

<sup>80</sup> Loone, S., Revived Bakun dam will not benefit local community Malaysiakini Internet News, (<http://www.malaysiakini.com>), 1 March 2001.

<sup>81</sup> Ibid.

<sup>82</sup> "Barrage de Foum Gleita", web-site: <http://www.sonader.mr/Barrage.html> accessed 20 February 2002.

<sup>83</sup> Cernea, M. (1997), "The Risks and Reconstruction Model for Resettling Displaced Populations", World Bank, Washington, web-site: <http://www.policykiosk.com/cer1.htm> accessed 25 February 2002.

Less than ten years after the dam was built, farmers complained of salinity problems and started to abandon their fields. By 1993, farmers had abandoned 237 hectares of the 1,950 hectares irrigated by the dam. In 1998, researchers on a Department for International Development (DFID, the UK aid agency) project discovered that alkalinity in the soils was a greater problem than soil salinity. Among other techniques to improve rice yields, the researchers advised the farmers to apply more phosphate fertilizer. Researchers also recognised “the potential of the alkalization problem getting worse – therefore, strategic research is needed to monitor soil degradation.”<sup>84</sup>

### **MIDLANDS, MAURITIUS**

In February 1997, the Central Tender Board of Mauritius awarded Lahmeyer International the contract to update a preliminary study, planning and construction supervision of the 30 metre-high, 2,450 metre-long Midlands dam.<sup>85</sup> A total of 1.5 million cubic metres of rock is needed to build the dam – from a nearby quarry covering 60 hectares, which was specially set up to provide material to build the dam. Water from the proposed reservoir is intended to meet the increased demand resulting from increased tourism in Mauritius, and is supposed to irrigate 3,500 ha of agricultural land. The project cost is \$60 million with funding from the Kuwait Fund for Arab Economic Development, the Arab Bank for Economic Development in Africa and the Development Bank of South Africa. The dam was due to be completed in late 2002.

### **ARUN III, NEPAL**

Lahmeyer International produced the feasibility study, tender design and construction design for the \$1 billion, 68 metre-high, 201 MW Arun III dam.<sup>86</sup> The World Bank withdrew its proposed funding of this dam in August 1995, accepting the arguments of local communities and NGOs opposed to the project.<sup>87</sup>

Lahmeyer International won the contract for construction supervision through a closed tendering process, involving no competition. The Nepal Electricity Authority (NEA) stated that the German government made Lahmeyer International’s involvement a condition for its contribution to Arun. Dipyk Gyawali, who resigned from the NEA board over Arun, told *Der Spiegel* magazine in 1994 that the contract with Lahmeyer was made under the old feudal regime, and that the close connection between the royal family and Lahmeyer is well known in Nepal.<sup>88</sup>

### **KAINJI, NIGERIA**

Lahmeyer International won a contract to refurbish the 760 MW Kainji dam on the Niger River. The Impregilo Group built the dam, which was completed in 1968 [see section on Impregilo]. Voest-Alpine supplied four additional Kaplan turbines.

The dam forced 44,000 people off their land to make way for the reservoir. Hundreds of thousands more people were adversely affected as their grazing and agricultural lands are no

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<sup>84</sup> “A Holistic Approach to Irrigated Rice Farming Problems Uncovers More Than Just Soil Degradation”, WARDA Annual Report, 1999, pp. 30-37.

<sup>85</sup> “Midlands Dam Project on Mauritius”, press release 5/97, Lahmeyer International, web-site: <http://www.lif.de/world-e/presse/9705.html> accessed 16 June 1999.

<sup>86</sup> McCully, P. (1996), op. cit. 51, p. 230.

<sup>87</sup> Ibid., p. 21.

<sup>88</sup> “Wagen vor die Pferde”, *Der Spiegel*, 44/1994, pp. 50-55.

longer irrigated by the river's annual flood.<sup>89</sup> Severe floods in recent years has caused serious problems for villagers living downstream of the dam. In 1999, at least 39 people were killed after floodgates were opened at the Kainji, Jebba and Shiroro dams.

### **CHICO, THE PHILIPPINES**

In 1973, Lahmeyer International produced a technical feasibility study funded by the World Bank for four dams on the Chico river with a total capacity of 1,010 MW.

The dams threatened to displace some 80,000 Kalinga and Bontoc people from their ancestral lands, destroying their villages and rice terraces.<sup>90</sup> When locals protested against the project, the Marcos regime tried to undermine resistance with bribery and obfuscation. However, resistance hardened and the people resorted to civil disobedience to prevent surveyors gaining access to the area. Engineers' campsites were dismantled and roads were blocked, prompting the government to send in the army and initiate a campaign of violence.<sup>91</sup> The Igorot leader Macliing Dulag was assassinated, and many people took to the hills and joined the New Peoples Army in defiance of the imposed development programme.<sup>92</sup>

The conflict endured long after the World Bank pulled out and the project was cancelled. Local villages were repeatedly bombed and subjected to counter-insurgency programmes as a result.<sup>93</sup>

Adolf Wannick says of his company's involvement in the Chico dams:

"I remember we were blamed in the Philippines, but these projects have never been built. There were resettlement issues and there was a lot of noise. But we came very soon to the conclusion that it was not worthwhile maintaining a position that was wrong. The trouble from such projects is so big, it's not worth acting against it."<sup>94</sup>

### **MAGUGA, SWAZILAND**

Lahmeyer International was involved in the 19 MW Maguga dam on the Komati River. Sogreah also worked on this project [see section on Sogreah]. The dam was a joint project between South Africa and Swaziland and 60% of the water from the project will go to South Africa. The dam was officially opened on 5 April 2002, by King Mswati III of Swaziland and Jacob Zuma, Deputy President of South Africa.<sup>95</sup>

The irrigation water from the dam will go mainly to industrial tree plantations and sugar cane cultivation. The Maguga dam was well into its design stage before Gibb (UK) carried out a study of the implications of the project on fisheries, in 1991.

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<sup>89</sup> McCully, P. (1996), op. cit. 51, p. 68.

<sup>90</sup> Bello, W., Kinley, D. and Elinson, E. (1982), *Development Debacle: The World Bank in the Philippines*, Institute for Food and Development Policy, San Francisco.

<sup>91</sup> Pearce, F. (1992), *The Dammed: Rivers, dams and the coming world water crisis*, Bodley Head, London.

<sup>92</sup> Drucker, C. (1984), "Dam the Chico: Hydro Development and Tribal Resistance in the Philippines", in Goldsmith, E. and Hildyard, N. (eds) *The Social and Environmental Effects of Large Dams, Volume Two: Case Studies*, Wadebridge Ecological Centre, UK, pp. 304-313; and Fay, C. (1987) *Counter-Insurgency and Tribal Peoples in the Philippines*, Survival International USA, Washington, DC.

<sup>93</sup> Survival International News (1985) No.7, 1985, cited in Colchester, M (1999) "Sharing Power: Dams, Indigenous Peoples and Ethnic Minorities," WCD Thematic Review Paper, 1999.

<sup>94</sup> Wannick, A. (1999) op. cit. 13.

<sup>95</sup> "Opening of the Maguga dam in Swaziland – A joint project between South Africa and Swaziland", Department of Water Affairs and Forestry (DWAF), South Africa, Press Release, 5 April 2002, DWAF web-site:

[http://www.dwaf.gov.za/Communications/Press%20Releases/2002/Press%20Release%20Maguga%20Opening\\_.doc](http://www.dwaf.gov.za/Communications/Press%20Releases/2002/Press%20Release%20Maguga%20Opening_.doc)  
accessed 7 June 2002.

### **BIRECIK, TURKEY**

Lahmeyer International was involved in the 672 MW Birecik dam. In 1995, the Syrian government demanded that Turkey stop work on the Birecik dam, arguing that Birecik and other dams on the Euphrates river would prevent Syria from receiving its rightful allocation of water, violating international law and renegeing on Turkey's previous commitments on water sharing. Coyne et Bellier was consultant to the Turkish government and investors and Alstom and VA TECH HYDRO were involved in the project [*see* sections on Coyne et Bellier and VA TECH HYDRO].

### **BUJAGALI, UGANDA**

Lahmeyer International worked with Norplan (Norway) to produce the design for the 200 MW Bujagali dam.<sup>96</sup> Skanska International and Veidekke (Norway) were together part of the Bujagali consortium hoping to build the dam, but Veidekke has now withdrawn following allegations of corruption [*see* section on Skanska]. The project developers are AES Corporation (USA) and Madhvani International (South Africa).

The project is now facing severe financial difficulties, following corruption allegations that led the World Bank to postpone indefinitely a decision on whether or not to agree further loans for the dam (*see* section on Skanska). If built, the dam would submerge highly productive agricultural land; destroy the Bujagali Falls (which is one of Uganda's prime tourist destinations); possibly lead to the extinction of rare fish in the Nile; cause thousands of people to lose their land and access to river resources; and lead to significant increases in Ugandan's electricity bills. 95% of Ugandans are in any case not connected to the national grid.<sup>97</sup> In 2001, shares in AES Corp. fell by 92%.<sup>98</sup>

Lahmeyer International produced a report on the CO<sub>2</sub> emissions of the Bujagali dam. The report attempted to compare the predicted emissions of the Bujagali hydropower plant with emissions from generating electricity through burning fossil fuels and concluded that "the generation of electrical energy at Bujagali will release over its life time about 125 to 250 times less CO<sub>2</sub> into the atmosphere than generation through burning fossil fuels".<sup>99</sup> The study was used to argue that the dam should receive tradable "carbon credits" under the Kyoto Protocol's Clean Development Mechanism. The claims made for Bujagali's eligibility for carbon credits have been disputed by non-governmental organisations.<sup>100</sup>

### **SENTANI, WEST PAPUA**

Lahmeyer International advised the German government's Kreditanstalt für Wiederaufbau (KfW), not to invest in the Sentani hydropower plant in West Papua. This was the only project that Adolf Wannick of Lahmeyer International could name that his company had recommended should not go ahead. He said, "The Sentani project was on this far away island, in Indonesia. I think it was abandoned for ethnic and environmental reasons."<sup>101</sup>

<sup>96</sup> "Bujagali Hydro-Power Dam, Uganda", web-site:

<http://www.power-technology.com/projects/bujagali> accessed 20 February 2002.

<sup>97</sup> "WB Approves Bujagali Dam Despite Major Economic Risks", International Rivers Network press release, 18 December 2001, web-site: <http://www.irm.org/programs/bujagali/index.asp?id=011217.wbapprove.html> accessed 17 January 2002.

<sup>98</sup> Schwarz, E. (2002), "AES says \$550 million Nile Dam Lacks Financing, Faces Delay", *Bloomberg*, 21 February 2002.

<sup>99</sup> "Bujagali HEPP – CO<sub>2</sub> Emissions", Lahmeyer International, Germany, web-site:

[http://www.bujagali.com/technical\\_resources/carbon\\_dioxide\\_emissions](http://www.bujagali.com/technical_resources/carbon_dioxide_emissions) accessed 20 February 2002.

<sup>100</sup> Haya, B., McCully, P. and Pearson, B. (2002), "Damning the CDM", International Rivers Network, Berkeley, 2002.

<sup>101</sup> Wannick, A. (1999) op. cit. 13.

## LAHMEYER: DAMS AT A GLANCE

### AFGHANISTAN

Lahmeyer International was involved in the **Mahipar** hydroelectric plant.

### ALBANIA

In the mid-1990s, Lahmeyer International and London Economics carried out studies funded by the European Bank for Reconstruction and Development (EBRD) to investigate the long run marginal cost of electricity at various voltages and consumer categories, and to develop an optimum tariff structure for the country. Another Lahmeyer International study also funded by EBRD, assessed the most important of Albania's hydropower dams. It concluded that the 500 MW **Fierza** and 250 MW **Vau i Dejes** hydropower plants on the Drin River and the 25 MW **Ulza** and 24 MW **Shkopeti** hydropower plants on the Mat River should be upgraded and rehabilitated.

### ALGERIA

The Ministère de L'Hydraulique contracted Lahmeyer International to oversee the rehabilitation of 17 dams (constructed between 1867 and 1970). The reconstruction was carried out between 1982 and 1985. In 1989, Lahmeyer International won a contract as civil design engineer on the 90 metre-high **Tichi Haf** water supply dam.

### ARGENTINA and PARAGUAY

**Yacyretá** dam [*see main*

*text*].

### ARMENIA

Lahmeyer International was involved with a modernisation programme for hydropower plants in Armenia.

### BANGLADESH

Lahmeyer International worked on the modernisation of the **Kaptai** hydropower plant.

### BRAZIL

In 1998, Lahmeyer International and Hochtief (a construction company in the RWE group) formed Onix Energia, which subsequently won the concession to build and operate the 880 MW **Campos Novos** hydroelectric plant on the Canoas river.

### BURMA

**Kinda** and **Ta Sarng** dams [*see main text*].

### CHINA

**Ertan** and **Xiaolangdi** dams [*see main text*]. Lahmeyer International is working on phase two of the **Guangzhou** dam. Voith is supplying four pump turbines, with a total capacity of 1,224 MW.

### CHILE

In January 2002, Lahmeyer International and Pacific Hydro Ltd. formed a joint venture to develop a 270 MW hydropower project on the Tinguiririca river. The dam is planned to supply electricity to Santiago and construction is planned to start in 2003.

### DOMINICAN REPUBLIC

Lahmeyer International worked on the **Los Toros** and the **Tavera** hydropower plant.

### EGYPT

**Naga Hammadi** dam and **Toshka** pumping station [*see main text*].

### ETHIOPIA

**Awash III** dam [*see main text*]. Lahmeyer International has been involved in dam-building in Ethiopia since the 1960s, including the **Fincha**, and **Aba Samuel** dams. Lahmeyer International is involved in the \$1 billion **Chemoga Yeda** hydropower scheme. Knight Piésold is also involved. Funding is coming from the African Development Bank. There are three dams involved: **Beles**, **Chemoga Yeda** and **Halele Werabesa**. In 2000, Lahmeyer International, Knight Piésold and Electrowatt Engineering formed a joint venture to carry out a feasibility study on the 219 MW **Beles** dam. The project will transfer water from Lake Tana to the Beles River, which is a tributary of the Blue Nile.

In 1998, the Ethiopian Electric Power Corporation awarded Lahmeyer International and Knight Piésold the contract for the tender preparation, construction and design planning and construction supervision for the \$270 million, 150 MW **Gojeb** dam.

## GERMANY

Lahmeyer International worked on the 1,060 MW **Goldisthal** pumped storage plant, on the Schwarza river in Thuringen, due to be completed in 2002-3. VA Tech Voest MCE supplied hydromechanical equipment. Lahmeyer International also modernised the **Sockingen** dam on the Rhine river and worked on the **Heidelberg-Karlstor** hydropower plant. In the mid-1980s, Lahmeyer International was civil design engineer on the 150 MW **Koepenwerk** pumped storage dam. The dam replaced a dam designed by Lahmeyer in 1927. The company was also civil design engineer on the rehabilitation of the **Sengbach** drinking water dam in Solingen. One of Wilhelm Lahmeyer's early dams was the **Gersthofen** dam in Bavaria.

## GUATEMALA

**Chixoy** and **Chulac** dams [see main text]. Lahmeyer International also worked on a Master Plan for Electric Power Development for Guatemala.

## ICELAND

Lahmeyer International was involved in the 120 MW **Sultartangi** dam [see section on Skanska].

## INDIA

Lahmeyer International is responsible for planning and project management on the 450 MW **Baghlihar** dam on the Chenab River.

## IRAN

The Iran Water and Power Development Corporation

(IWPC) contracted a consortium comprised of Lahmeyer International, Nippon Koei (Japan) and Moshanir (Iran) to do a feasibility study for the \$1 billion, 170metre-high, 1,000 MW **Godar-E-Landar** hydropower plant. The project was funded by Japan until Japan withdrew the second tranche of the loan under pressure from the US government. In 1997 the dam was renamed as the **Masjed-E-Soleyman** dam. Lahmeyer International is responsible for the feasibility study, tender design and tender documents, tendering, tender evaluation and contracting, construction design, construction supervision and commissioning of the Masjed-E-Soleyman dam on the Karun river. Under phase II of the project, the dam's design capacity will be increased to 2,000 MW. The dam is due to be completed in 2003. Knight Piésold also worked on the dam.

Lahmeyer International was civil design engineer on the **Sian Bishe** pumped storage hydropower dam on the Chalus river in the Albor mountain range.

Lahmeyer International is also involved in the 1,000 MW **Karun I**, the 900 MW **Karun IV**, the 127 metre-high, 400 MW **Karkheh**, the 1,000 MW **Shahid** dam (Siemens' Brazilian subsidiary supplied components for the Shahid dam), the 2,000 MW **Upper Gotvand** and the 500 MW **Rudbar Lorestan**

hydropower dams.

## JAMAICA

Lahmeyer International is working on the rehabilitation of five mini-hydropower plants in Jamaica.

## LAOS

**Nam Leuk**, **Nam Mang 3** and **Nam Theun 2** dams [see main text]. In 1996, the company produced a master plan for hydropower development for Laos, funded by the European Commission. In January 2000, in association with Worley, Lahmeyer International produced a "Hydropower development strategy study" for Laos. It also wrote the environmental impact assessment for the **Nam Song** dam, winning the contract after producing a study in 1990 which recommended increasing the capacity of the existing Nam Ngum reservoir by diverting water from the Nam Song and Nam Leuk dams. Lahmeyer International worked on the **Nam Mang 5** dam.

## LESOTHO

Lesotho Highlands Water Development Project (LHWP), including the **Mohale** and **Muela** dams [see main text].

## MALAWI

Lahmeyer International is responsible for the design and construction supervision of the World Bank's National Water Development Project in Malawi. It also carried out design and construction management of the 21

metre-high **Mpira**, the 24 metre-high **Mzuzu** and the **Kasungu** water supply dams. Lahmeyer International provided the Assistant Chief Site Construction Manager / Project Manager on the 50 MW **Tedzani III** dam.

#### **MALAYSIA**

**Bakun** dam [see main text]. The company also worked on the 170 MW **Liwagu** hydropower plant.

#### **MALI**

Lahmeyer International worked with Sogreah on the modernisation of the **Sélingué** hydro-power plant on the Sankarani River (a tributary of the Niger River). The dam, which has a reservoir covering 430 km<sup>2</sup>, was completed in 1984.

#### **MAURITANIA**

**Koum-Gleita** dam [see main text].

#### **MAURITIUS**

**Midlands** dam [see main text].

#### **MOZAMBIQUE**

In January 1999, a consortium consisting of Lahmeyer International, EdF, Knight Piésold and the Mozambican Unit for the Implementation of Hydroelectric Projects signed an agreement to carry out a \$7 million feasibility study for the \$1.7 billion, 2000 MW **Mpanda Ncua** dam, about 70 km downstream of the Cahora Bassa dam. The feasibility study was funded with grants from Germany and France.

#### **NEPAL**

**Arun III** dam [see main text]. The company also designed the original 69 MW **Marsyangdi** dam, funded in 1984 by the World Bank. Voith supplied turbines and Siemens supplied electrical equipment to the project. In 1997, the Nepal Electricity Authority contracted Lahmeyer International to update a feasibility study, and to “expand its scope to meet the requirements of financing institutes” in the words of Lahmeyer International’s press release, on the \$100 million, 42 MW **Middle Marsyangdi** hydropower plant. Germany’s KfW funded the study.

#### **NIGER**

In 2002, Lahmeyer International and Dar Al-Handasah (Egypt) completed a feasibility study on the **Kandadji** dam, with funding from the African Development Bank. Between 1976 and 1982, EdF, Sofrelec and Alexander Gibb and Partners carried out studies for the proposed Kandadji dam. The proposed projects ranged from 125 to 250 MW.

#### **NIGERIA**

**Kainji** dam [see main text]. Lahmeyer International won the contract to supervise the rehabilitation of the **Jebba** and **Shirojo** dams.

#### **PAKISTAN**

In 1995, the Sarhad Hydel Development Corporation (SHYDO), Pakistan commissioned Lahmeyer

International and Knight Piésold (UK) to produce conceptual and feasibility studies of the hydropower potential of the Allai Khwar river. The studies were financed by Germany’s KfW. Lahmeyer International was involved in the construction of the 140 MW **Allai Khwar** dam, and also worked on the 170 MW **Kuz Khwar** and the 700 MW **Chor Nala** dam.

#### **PHILIPPINES**

**Chico** dams [see main text]. Lahmeyer International produced the feasibility study for the 101metre-high, 60 MW **Abuan** hydropower project and was geotechnical and tunnelling expert on the underground powerhouse for the **Agus IV/V** hydropower dam.

In 1992, Lahmeyer International and Nippon Koei (Japan) produced studies of the 30 MW **Ambrayan C** dam in Benguet province, the 112 MW **Kanan B1** dam, the 30 MW **Natalang A** dam and the 45 MW **Natalang B** dam. In 1996, Lahmeyer International produced a study of the 33 MW **Pacuan-Guinobaan** dam.

#### **ROMANIA**

In 1898, Lahmeyer designed the 1 MW **Sinaia** hydropower plant in Romania.

#### **SLOVENIA**

Lahmeyer International worked on the modernisation of three hydropower plants on the river Drava in Slovenia. The first stage of the

refurbishment cost DM206 million, part-funded with a loan from the European Bank for Reconstruction and Development.

#### **SRI LANKA**

Lahmeyer International is part of the consortium (with Electrowatt and Nippon Koei) for the planning and supervising construction of the 48 metre-high, 80 MW **Kukule Ganga** hydropower plant, due to be finished in 2002. The project cost is \$125 million, financed in part by Japan's JBIC. Lahmeyer International is responsible for the underground civil construction work. Skanska is building the dam.

Lahmeyer International is preparing a feasibility study for the 1050 metre-long, 10 MW **Moragahakanda** dam. The project is part of a long term dam-building plan for the Mahaweli Ganga, Sri Lanka's major river basin. Dams already completed under this scheme include the Kotmale [see section on

Skanska], Victoria, Randenigala, and Rantembe dams.

#### **SWAZILAND**

**Maguga** dam [see main text].

#### **SYRIA**

In 1993, Lahmeyer International and Electrowatt Engineering won the contract to assist in the planning and construction supervision of the 630 MW **Tishrin** hydropower plant. The first unit was commissioned in 1999. In 1998, Lahmeyer International was appointed as consultant on the rehabilitation of the 630 MW **Muhardeh** dam.

#### **TANZANIA**

In 1996, the company produced a conceptual study of possible hydropower development in Tanzania, commissioned by Tanzania's national electric supply company Tanesco. Tanesco also commissioned Lahmeyer International to produce a feasibility study

of the most promising option, which Lahmeyer International identified as the 9 MW **Lower Nakatuta** dam.

#### **THAILAND**

In 1991, Lahmeyer International was civil design engineer for the 107 metre-high, 80 MW **Kaeng Krung** dam.

#### **TURKEY**

**Birecik** dam [see main text].

#### **UGANDA**

**Bujagali** dam [see main text]. Lahmeyer International is involved in the 350 MW **Kalagala** dam in Uganda.

#### **WEST PAPUA**

**Sentani** dam [see main text].

#### **ZAMBIA/ZIMBABWE**

Lahmeyer International did several studies and evaluations including environmental assessments for the planned 176metre-high, 1,600 MW **Batoka Gorge** hydropower project.

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