Phulbari Coal: A Parlous Project

A critique of the GCM Resources PLC[1] Environment and Social Impact Assessment (ESIA) and Summary Environmental Impact Assessment (SEIA) for the Phulbari Coal Mine Project in Bangladesh

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For

Bank Information Center

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[1] Asia Energy plc changed its name, first to Global Coal Management, and then to GCM Resources plc, the company which now has full management responsibility for the Phulbari project. The earlier name is used throughout this report where it cites content of the Phulbari ESIA and SEIA.

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Acknowledgments

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Documents Examined For This Critique

The Phulbari Coal Project ESIA (Environmental and Social Impact Assessment) was prepared by SMEC International Pty Ltd, with geotechnical reports commissioned, inter alia, from GHD, MineConsult and Golder Associates. It was published by Asia Energy plc in May 2006, after completion in April 2006. A separate ESIA was prepared to evaluate impacts of the coal transport project and is referenced in this critique as "ESIA coal transportation". A Summary Environmental Impact Assessment for the Asia Development Bank (ADB) was published by Asia Energy plc in August 2006 and is here referred to as SEIA.

Content of ESIA volume 4, chapter 1 (the PCDP – Public Consultation and Disclosure Plan, and volume 4 chapter 4 (Draft Resettlement Plan, under revision at the time of writing this report) have been critiqued separately in *Phulbari Coal Project: An Assessment of the Draft Resettlement Plan Prepared by Global Coal Management/Asia Energy Corporation, August 2008*, by Jennifer Kalafut, co-director of the International Accountability Project and commissioned by BIC (US). These chapters are not considered in this critique; nor are the provisions for land acquisition and compensation, or resettlement measures envisaged for the coal transport project – which have still to be confirmed. However, the socio-environmental consequences of land acquisition and loss of related resources are addressed here.

The present paper also omits any examination of alternatives to the current mine and the coal transport plans, as considered by the project proponents. Volume 2 chapter 2 - the feasibility study (Revision B) prepared by GHD Pty Ltd (a leading Australian professional services company) on coal geology and resource assessment – is in draft only, and therefore only briefly cited

Style note: Statements which point to apparent weaknesses in the ESIA or SEIA are highlighted in this critique using bold italics.

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[2] *Phulbari Coal Project: An Assessment of the Draft Resettlement Plan Prepared by Global Coal Management/Asia Energy Corporation November 3, 2008 (Acrobat pdf, 375 KB)*, International Accountability Project, http://www.bicusa.org/en/Project.Resources.59.aspx

PART ONE: The Various Pitfalls of Phulbari

1.1 Complex Project in a Complex Setting

The integrated Phulbari coal mine, coal rail-river transport and coastal coal offloading project, is of such dimensions that it would prove highly challenging even for a "developed" country: it poses not only numerous socio-environmental problems, but also demands a highly sophisticated degree of regulatory adhesion, long-term monitoring and component implementation. Among its design components are a mine with a life of at least 36 years [ESIA vol 1, chapter 1 page 8][3], at a maximum extraction rate of 16 million tonnes of coal per year at peak output, to depths of 300 metres [ibid page 10]; and 5, 192 hectares of land required for mine development [ibid.] An additional 741 hectares will be requisitioned for town extension, new villages and transport infrastructure. Although "[e]nvironmental and social impacts associated with [these elements of the project] have not been assessed in detail in this ESIA" [ibid page 6], we are supposedly reassured that "sufficient information and assessment has been undertaken to demonstrate that viable settlement design and coal transport options are available" [ibid; see also ESIA vol 1 chapter 11]. Yet the project is being proposed, in its present form and dimensions, for a lesser-developing country with a poor record of environmental compliance and considerable weaknesses in regulatory enforcement. This is recognised in both the SEIA and the ESIA where it is stated (*inter alia*) that:

- "Many [Bangladeshi] laws are outmoded and most are not understood or are currently not enforced in terms of functional authority (IUCN2005)" [ESIA vol 1, chapter 2, page 5]
- "Bangladesh is inconsistent [in implementing] rules and regulations in many fields." [SEIA para 265]
- "…Open cut mining is new to Bangladesh. Much of the mining legislation is outdated and does not address contemporary issues such as rehabilitation, overburden placement and mine site water management" [ibid]
- "Water: There is no overarching water Act in Bangladesh…" [ibid page 9]
- "There is no legislation or policy directive in relation to aquifer operations" [ibid page 10]
- "Although the Acquisition and Requisition of Immovable Property Act 1994 is the main legislation used for land acquisition, it has shortcomings that may hamper the proper resettlement and rehabilitation of the affected people." [ESIA vol 1, chapter 2, page 12]
- "Bangladesh is not a signatory to the Safety and Health in Mines Convention of 1995." [ESIA vol 2, chapter 7, page 80]

[3] Page numbers in the ESIA are those appearing on the soft (on-screen) version of the report. Attempts to secure a hard copy of the full ESIA from the Asian Development Bank proved unsuccessful. The pdf version of the ESIA, as provided by the ADB, has been "locked up" to resist either printing out or conversion to text by using any currently available software programme known to the author's IT advisor.

Who, then, is to address these deficiencies, in the context of the most challenging mining project the country has ever faced? In most respects the operating company, Asia Energy plc, should come up with management plans (MPs) to mitigate numerous legislative deficiencies, specifically in relation to water management and many aspects of the coal transportation scheme.

While "the decision-making process of the government of Bangladesh (GoB) is not within the control of Asia Energy (sic)", something admitted to have "… major implications for the granting of the numerous government approvals required…" (ESIA vol 1, chapter 15, page 5), nonetheless the company is expected to assist the GoB in building a range of capacities and instrumentalities, including acquisition of land titles [ESIA vol 1, chapter 2, page 13] and even framing new mining legislation. It is quite extraordinary that the SEIA and ESIA envisage these highly demanding tasks be entrusted to a private company, rather than an established state enterprise or experienced international agency. (One suspects, however, that the World Bank might resist such an invitation in view of its signal failure to implement capacities for Coal India Ltd through technical and socio-environmental support programmes between 1996 and 2001 [see: <http://www.brettonwoodsproject.org/art-16077>].

1.2 Vague Assurances and Speculation in the SEIA and ESIA

Of equal concern should be the degree to which the SEIA and ESIA depend on vague assurances and a high degree of speculation about future measures that might (or, might not) be adopted to mitigate problems in the proposed overall project design. There are many instances of this to demonstrate that the "Precautionary Principle" and the concept of "Intergenerational Equity" ("The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations" [ESIA vol 1, chapter 3. page 5]) have merely been paid lip service.
For instance:

* "The mine water balance ***indicates*** that water will be available throughout the dry season, thus a third irrigation of crops ***should*** be possible" [ESIA, vol 1, chapter 6, page 60]:

* "Beels [wetland ponds] will be retained and maintained ***wherever possible***' [SEIA paragraph 107 (ii)]

* "Local indigenous species will be given priority where feasible… [other species of trees and plants] will be planted ***where possible***" [SEIA para 107 (vi)]

* "The proposed barging and shipping operations are ***considered unlikely*** to have any significant adverse impacts [on river hydrology et al]" [SEIA, para 144]

* "Small areas [of land] especially the area north of the mine site ***could be*** **i**nundated [because of land settlement resulting from extraction of groundwater] during a 100 year flood" [SEIA para 84]

* "…mine dewatering flows are ***unlikely*** to cause any hydrologic or hydraulic problems…" [SEIA para 85]

* "The adverse effects of aquifer induced land subsidence can be ***minimised*** by adopting appropriate remedial measures, ***such as*** installation of recharge wells and dykes" [ESIA vol 2, chapter 5, page 91]

* "The rail corridor operations are ***unlikely*** to cause gross groundwater contamination…" [SEIA para 123]

* "The ***preliminary*** contamination assessment ***indicates*** that soil contamination is unlikely at the Coal Terminal site" [ESIA Coal transportation, chapter 9, page 16]

* "***Where possible***, place stripped soils into rehabilitation areas and re-vegetate immediately" [SEIA Appendix 1- 2]

* "There is the ***potential*** for generation of employment opportunities created directly and indirectly by the Project. Indirect employment ***may*** be created due to availability of coal and other by-product industries…" [ESIA vol 1, chapter 10, page 110]

* "Mines can ***generally*** be rehabilitated so that most of the affected and can be returned to the original or…alternative use" [ESIA vol 1, chapter 14, page 11]

* "It is ***not expected*** that combined ambient and mine emissions will be greater than the 24 hour maximum World Bank limit" [ESIA vol 1, chapter 15, page 10]

* [Re adverse groundwater drawdown]: "This issue has a high severity/consequence of affecting groundwater resources available to Phulbari and village communities surrounding the mine. ***Despite this*** there is a high degree of confidence that proposed aquifer injection and irrigation schemes will mitigate potential impacts" [ibid]

* "The impact of dewatering the Permian sediments are ***expected*** to be ***largely contained*** within the basin" [ESIA vol 2, chapter 3, page 32]

* "[T]he long term impacts of increased water levels [in the rivers] are unknown; it is ***possible*** in the long term that there ***may*** be impacts to primary productivity with consequent impacts to species diversity, abundance and to fish production" [ESIA vol 3, chapter 3, page 135]

* "It is ***not likely*** that an oil spill would result in extreme mortality (sic) of established mangrove forests" [ESIA, chapter 12, page 53]

1.3 Over-Confidence in Monitoring and Mitigation Capabilities

These are by no means the only examples of a lack of authority, or defects in evaluation, evidenced in the assessments. Clearly, the more frequent the speculative elements, the greater the pressure placed on GCM/Asia Energy, and its sub-contracted parties, to properly implement the proposed EMPs (environmental management plans) - specifically those relating to coal transportation, which are supposed to be updated on an annual basis [ESIA volume 1, chapter 14, page 5]. An inordinate amount of confidence (compared with many other projects of this type) is being vested in the quality of monitoring of "trigger" events, and the capacity of various personnel to recognise such events, and then swiftly pre-empt them. Even the most accomplished authorities, or experienced mine managers, may have little or no prior warning of critical failures

- such as the collapse of a waste dump, landslide of mine workings during a torrential downpour or earth tremor, or collision and capsizing of vessels at sea or in the river.

1.4 Asia Energy – a Leader in Environmental Practices?

Insofar as adverse – potentially severe consequences – from such events fall on the company, rather than the government, then the report's bald assurance that Asia Energy/GCM Resources plc is "a leader in environmental practices" is highly questionable and verges on the mendacious. It was listed on London Stock Exchange's AIM (Alternative Investment Market) only five years ago. It possesses no pedigree, as a company, in operating mining projects of any kind, let alone on the scale of Phulbari. While two members of its board and management do have experience in coal mining, they have not faced the particular challenges of a multi-faceted endeavour such as Phulbari (with the possible exception of the Kaltim Prima coal mine in East Kalimantan). Indeed, GHD Pty Ltd, in its estimation of risks contained in the company's *Admission to Trading* document ("the prospectus"), required before Asia Energy could be listed on AIM, noted that it was: "… a recently formed company with a limited operating history upon which prospective investors may base an evaluation of its likely performance. In addition, the management team of the Group has in general only had recent involvement in the activities of the Group." [Prospectus, Asia Energy plc, 13 March 2004, page 16].

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Disturbingly, there is nowhere the recognition that, in view of the lack of the company's provenance, it should post a realistic Bond (insurance) to cover all costs of unpredicted failures and accidents and all aspects of post-mine reclamation, including compensation claims which almost inevitably will be made outside the compensatory process for land loss and resettlement (and which still has to be formulated).

1.5: Some Good Research, Undermined by Numerous Qualifications

Many elements of the project are well-researched, in particular those examined by GHD, and the diligent biodiversity study by NACOM. But this is not necessarily reassuring, since the deeper the investigation has gone, in some cases the stronger the need for further research; such as in coping with pyritic material in stockpiles and waste dumps; the consequences of seismic disturbances within the mine "footprint"; or the nature of benthic fauna and flora in the river and seabed earmarked for massive sediment dredging (see below).

Taken as a whole, and given the excessive number of qualifications to many of their conclusions, the assessments are by no means encouraging. Even if it were possible to endorse one part of the entire project (such as a mine-mouth power plant), this should not automatically lend credibility to its other aspects. As currently mapped, the project vests overwhelming economic viability on conveying coal mined in the Phulbari lease areas, through rail to India, and rail and river links to the south of Bangladesh for sea-borne export from a coastal terminal. A "worst event" (such as mentioned in paragraph 1.3 above) at any stage along this transportation route could reasonably be construed as being more serious - both in the short and long term - than one occurring at the mine itself, and a threat to the viability of the entire scheme.

1.6: Four Unanswered Fundamental Questions

Close scrutiny of the ESIA and SEIA elicits many unanswered questions (examined below). Additionally, four fundamental issues - which should have been adequately addressed before initiating project design - remain unaddressed:

1) *Keeping the home fires burning – but at what cost to water?*

Will the majority of the mined coal remain in Bangladesh? If so, how much will be absorbed by a possible mine-mouth power plant, and what would be the likely demand on precious underground water resources? Base load figures of 500MW, 1,000 MW and 2,500 MW for such a plant have been cited by the company at various times. Asia Energy's March 2004 prospectus for entry to AIM envisaged a power plant in two stages, with a total generating capacity of 15,400 GW per hour a year (sic) on completion, consuming nearly 5 million tones of coal per annum. This appears to conflict with the SEIA which earmarks 3 million tonnes pa for a 500 MW capacity plant, albeit with some minor local marketing of coal [SEIA paragraph 7].

Significantly, the prospectus stated that: "The power station water demand is ***expected*** to be less than that produced from aquifer and mine dewatering activities, making the [Phulbari] project self sufficient in this regard. The majority (sic) of water is used for power station cooling purposes. Cooling tower design to suit local conditions will be carried out in the Feasibility Studies. Surplus water is available for agriculture and drinking water" [Asia Energy plc Prospectus; Admission to trading on the Alternative Investment Market, 31 March 2004]. The ESIA, appearing a year after Asia Energy's listing on AIM, settles for a "proposed capacity" of 500 MW, with the "potential" to increase to 1,000 MW [ESIA vol 1, chapter 12, page 5].

However, the prospectus excludes any estimation of the critical impacts on water availability and quality, for any mine-mouth power plant, since "the Phulbari Power Station was not defined at the time of assessment." [ESIA, vol 1, chapter 12 ibid, page 8.]. Having admitted this, the ESIA nonetheless blandly asserts that the station's demand for cooling water – estimated at 40 M/l a day for a 500 MW plant - would be "sourced from groundwater, either from the mine dewatering system or a new tube well field south of the mine footprint" [ibid].

Implementing either one of these alternatives would arguably cause unacceptable attrition on available water supplies. We are told that: "Installation of a new bore field to the south of the Phulbari Power Station has the potential to exacerbate the water drawdown in this area in comparison to that modelled for the Project alone." The only consolation offered is that "… the aquifer system ***may*** make more water available in this area" [ibid]. Given existing deficiencies in water availability, and the plethora of unaddressed issues over water requirements for the mine itself, it is highly likely that operating a captive power plant (even with a modest 500MW design output) would prevent adequate water reaching agriculture, fisheries, local industry and household. (For further discussion see "Water" section below).

2) How much of the product coal will actually remain in Bangladesh or be transported by land to India?

That "the mine would not be viable without export revenues" has become the project's mantra [Phulbari Coal Project, Feasibility Study and Scheme of Development, Executive Summary, October 2005, page unnumbered]. According to the feasibility study, the majority of the output (8 million tonnes) is earmarked for marine export [SEIA paragraph 7]. Indian buyers are presumed to become ready purchasers of some 4 million tonnes of Phulbari coal [SEIA ibid] with around 3

million (at full output) remaining in the country, "some for a possible mine-mouth power plant" [Phulbari Coal Project Feasibility study op cit]. However, these calculations were made in 2006. New Indian coal fields have been opened, or expanded, during the two years since, while the world's biggest exporters of thermal and metallurgical coal (Xstrata, Rio Tinto, BHP Billiton) have all significantly increased production to meet rising global demand. This is not the place to rehearse arguments over the economic viability of the project's export component. Nonetheless, it seems clear that the environmental, land acquisition and "resettlement" impacts of the proposed rail-river-sea linkages are very damaging – and these have export as their only rationale. (It should also be noted that the Asian Development Bank's policy (Energy Policy 1995) regarding its funding for Coal projects ***requires*** that the project be a mine-mouth project primarily geared towards domestic production. It therefore seems likely that the power plant proposal was inserted into the SEIA to ensure that the private sector department of the ADB could justify its funding, even though the technicalities of the project are geared towards coal exports.).

3) How much (if any) of the metallurgical grade coal will be utilised within Bangladesh, thus providing potential value addition? Which (if any) industrial plants are realistically on the drawing-board as customers of such coal?

Tata has now withdrawn a 2004 proposal to exploit Bangladesh's gas reserves for its own purposes, and to use metallurgical quality, "coking", coal for a steel plant(s). Although the Indian company planned to access this supply from north-eastern Bangladesh, Tata was a potential customer for Phulbari. Calculations of how much metallurgical grade coal might enter the market do not exist - primarily because there are no confirmed customers for it within Bangladesh.

4) Going underground?

Has it been proven that the Phulbari ore body is not amenable to underground exploitation? Comparisons are drawn in the ESIA with the nearby Barakupuria underground coal mine whose pollution, and accident rates, have clearly been unacceptable. But the arguments presented against underground exploitation of Phulbari coal itself appear flimsy, under-rehearsed, inadequately-tested, and motivated by economic rather than technical or socio-environmental concerns – to the extent that open-pit mines are far cheaper to construct and manage.

Asia Energy's rationale for rejecting underground mining was summarised in the SEIA as follows: *"Extraction of coal with the underground mining methods was considered but ruled out on the basis of poor coal resource recovery, low production rates, and the fact that ground caving following coal extraction would eventually interact with the highly permeable Tertiary aquifer system. This presents an unacceptable operational risk associated with ground collapse and mine flooding" [SEIA para. 201].* To *"reduce the degree of breaching of the overlying rock, an underground mine at Phulbari would require maintaining significant ground-supporting pillars, resulting in difficult mining conditions and low coal production. It is estimated that a coal recovery ratio of less than 10% would be achieved; thus, most of the in-situ coal reserve would not be extracted and the majority of this valuable resource would be left under the ground with no way of extracting it" [ibid para 202].* It was further claimed that: *"Underground longwall mining can also cause land subsidence, the extent dependant on the depth of coal, overlying strata and width and height of the longwall. Subsidence can cause damage to structures and significant hydrological and land use impacts. At Phulbari the depth to the most significant coal is around 150–250 m and land subsidence of several meters could be expected." [ibid para. 203]*

These are all critical considerations; the most important of which is the possibility of post-mine ground subsidence. But, without provision in close detail of the alleged "difficult [underground]

mining conditions" and measures that might be taken to compensate for them, it is impossible to judge whether the assumed recovery ratio of "less than 10%" is realistic, or intentionally pessimistic. While it is true that modern underground longwall mining often results in subsidence, defenders of the technology claim that this can be "controlled", and its worst impacts pre-empted. Coal recovery rates are also considerably higher than from typical "room and pillar" extraction methods.

This is not to implicitly defend an underground mine at Phulbari. It is, however, to point out that GCM/Asia Energy appears to have treated this option with cavalier disregard. Moreover, two justifications given for rejecting the underground alternative - adverse impacts on the tertiary aquifer system and the likelihood of severe water ingress to the workings – themselves undoubtedly apply to the present open-pit proposal.

According to one Bangladeshi mineral geologist, who maintained close contact with BHP (now BHP Billiton) when the Australian company was assessing the Phulbari deposit in the 1990s before the license was handed over to Asia Energy: *"We knew BHP would not be able to fulfil environmental requirements similar to Australian standards for strip mining at more than 150metres below the ground. BHP could not locate a shallow coal deposit around 100m depth; the Phulbari deposit is much deeper between 150m and 260m. BHP knew very well that an open-cut mine at such depth would need multi-dimensional long-term environmental studies besides tackling geological and engineering problems. Considering flood-prone deltaic region having numerous rivers with heavy monsoon rainfall, it is easy to understand that it would be rather impossible to pass … environmental regulations of any country, not to speak of comparable Australian standards."* [Nazrul Islam "Reflections on Phulbari Coal Project", New Age, Dhaka, 14 September 2008].

1.7 Politics – there's the Key

These, and other, questions carry clear political connotations. So long as the citizens of Bangladesh fail to agree a comprehensive energy policy (or are inhibited from doing so) - and then a national coal policy – the questions cannot be answered. Vital decisions have still to be made through a truly democratic process, freed from the intimidations and human rights abuses which have characterised much of the Phulbari discourse (or lack of it) to date. An environmental critique of the project as it stands can certainly make important judgments. For instance, abandoning the sea borne export segment of the project would avoid pollution risks posed to the Bhairab-Rupsa-Pussur river system, and more particularly to the Sunderbans Protected Forest (SPF), a Ramsar Convention/World Heritage site.

It could be argued that Asia Energy was not required to test this, or other, alternatives; in any case they fall outside the company's remit [see: SEIA paragraph 112]. Nevertheless, until a coherent national energy and subsequently a coal policy are determined, the strong impression will persist that the company, with the backing of some in the Bangladesh administration and the explicit support of the British government, has been driving its own furrow through Phulbari and beyond - guided overwhelmingly by its own commercial considerations.

1.8 The Burden of Global Greenhouse Gas (GHG) Emissions (GGE)

The World Bank's Extractive Industries Review (EIR), performed under the aegis of Emil Salim (a former Minister for the Environment in Indonesia and director of a national coal company) was

submitted to the Bank in January 2004. It set out a "pro-poor", environmentally sustainable agenda for the Bank's investments. Among its recommendations was the immediate phasing-out of loans for coal projects and new funding to be provided for generating renewable energy. The need to "de link" coal-fired plants from their role in generating GHG/GGE was a key justification, provided in the EIR, for advising a change in the Bank's lending policies ["The Extractive Industries Review: Striking a Better Balance", World Bank, January 2004]. Although the Bank rejected this recommendation, it has more recently (however shakily) "show cased" its concerns about increased global warming. Many other authorities have also pointed to the uniquely heavy contribution that coal burning makes to adverse climate change, which is widely recognised today as the largest single environmental threat to the planet.

It is, therefore, puzzling – to say the least – that the potential contribution of the Phulbari project to additional global greenhouse gas emissions (both at construction phase and as an operating mine) is barely considered in the ESIA; and where it has been, is minimised. Nor is there any consideration of GHG carbon capture and sequestration (CCS) - although it should be noted that a number of authorities question the viability of this largely untried technology. In the context of the project's coal transportation components we are informed that, while rail operations "are responsible for 73% of the Project's GHG emissions . . . [o]verall these emissions are not significant." [ESIA Coal transportation, chapter 8 page 27]. However, "it is estimated that GHG emissions for the construction and upgrade [of rail links] will be 198,799 tonnes of C02e" [ibid]. Anticipated fuel usage will "emit 4,068, 630 tonnes CO2e over the life of the Project" and 51 tonnes CO2e will be "attributable to electricity consumption" [ibid]. Whether these emissions are almost negligible, as the ESIA suggests, is manifestly not a judgment to be entrusted to the Project proponents. This is all the more obvious, since the assertion is made in comparison to data which is now eighteen years old: "Bangladesh's national GHG inventory in the year 1990 (sic) equated to 72 million tonnes C02e." [ibid, page 28].

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It is increasingly accepted (e.g. by the UK Carbon Disclosure Project) that embedded carbon values in coal should be taken into account when judging a company, or project's, likely contribution to GGE. There is no such recognition in the ESIA or SEIA. Indeed, "potential impacts associated with coal transport into India or during transit to overseas markets" have specifically not been taken into account [ESIA for coal transportation, chapter 1, page 11] and examination of the "potential impact relating to the use of the product coal" is also excluded [ESIA ibid]. Nor is any reliable estimate provided of the GGE burden from electricity used during mine construction and expansion, or from coal consigned to brick kilns (We are simply informed that the GoB "has enacted policies to control [such] emissions" [ESIA vol 1, chapter 12, page 10]) - and the upgrading of extracted co-products.

1.9 In Bed with Methane?

Methane could arguably play a major role in meeting Bangladesh's medium-term energy requirements, currently estimated at a deficiency of 2,000 MW below a required 5,000 MW) This was recognised in the second draft version of Bangladesh Coal Policy document, published in late 2005, where it was urged that: "The coal bed methane technology for recovering gas from deep coal reserves…be promoted" with Petrobangla "develop[ing] the coal bed methane project with public sector financing or as joint venture with investors" [Bangladesh Coal Policy (draft). Energy and Mineral Resources Division of the GoB's Ministry of Power, Energy and Mineral Resources, Version 2, 22 December 2005, page 18]. Methane is inevitably released to the atmosphere during any type of coal extraction (including, of course, a prospective Phulbari mine) where it is around 23 times more potent a GGE contributor than C02. Bangladesh holds huge amounts of methane in its coal beds, with the prospect of adopting coal methane capture technology – possibly to the ore body at Phulbari itself, and certainly to the Jamalganj field, whose deposits have been judged too deep for exploitation by conventional mining methods. [see: MB Imam and SH Akhter, "Coal bed methane prospect of Jamalganj coal bed, Bangladesh", Arabian Journal for Science and Engineering, number 27, 2002]. Yet this potential has been largely ignored in Bangladesh and manifestly so in the ESIA's consideration of alternatives to meet the country's "energy crisis." This omission seems extraordinary in light of Bangladesh's specific, perennial, jeopardy from global climate change. The environmental impacts of accessing coal bed methane, particularly on aquifers and the stability of host ore bodies are not to be ignored. The point here is that the potential for employing this technology, widely used in the US, Canada and being developed elsewhere - as in South Africa and the UK [see: "How methane could spark a revolution", Guardian, London, September 8 2008], has not been assessed for Bangladesh in order to meet its chronic energy shortage. The costs of introducing this technology, even on a pilot basis, are not negligible. However, it is now classified as a clean energy development mechanism (e.g. by the US Environmental Protection Agency) and could therefore attract development funding, while carbon offsets from coal bed methane capture are already being traded on the Chicago Climate Exchange.

From its outset, the SEIA boasts that the project will "provide the country with a vital new source of sustainable energy." [SEIA 1,1]. The assertion is palpably false: coal is a fossil fuel which cannot be replaced, except over many millennia, while the Phulbari mine has a projected life of around 36 years. If the objective of producing sustainable energy were to be taken seriously, it would require urgent examination of scenarios to:

1) Limit output from the Phulbari deposit, and significantly extend the mine life, so as to reduce its current "footprint";

2) Employ coal bed methane extraction or similar technology;

3) Adopt alternative renewable sources of energy (wind, solar, tidal, wave power).

1.10 Phulbari Land: Lost – and not Found

As noted in the ESIA: "Few projects in Bangladesh have involved such large scale land acquisitions" [ESIA vol 1, chapter 15, page 8]. The report goes on to compare the Phulbari project with the Chittagong Hill Tracts Land Acquisition of 1958 and the Jamuna Multipurpose Bridge Project of 1995 [ESIA vol 1, chapter 15]. It fails to point out that, in both these cases,

there were major crises associated with displacement, loss of land and livelihoods, and negative environmental impacts; and in the first case, the gross abuse of Indigenous peoples' rights - many of which continue to this day.

It is acknowledged [ESIA vol 1, chapter 1, page 6] that: "Environmental and social impacts associated with design of a new town and villages and coal transport infrastructure and operations have not been assessed in detail in this ESIA. This…will require significant GoB (Government of Bangladesh) involvement and operational management and is outside direct control of Asia Energy." Just what the role of the company is intended to be is not at all clear, since we are also told that "[a]s the acquiring body…[Asia Energy] is responsible for initiating the land acquisition process…and is preparing a Land Acquisition plan for the entire area [affected by the project]." [ESIA Volume 1 chapter 2, page 13.] In any event, strong doubt is cast on the capacity of the GoB to implement and oversee this process equitably or effectively: "As already pointed out, although the [GoB] Acquisition and Requisition of Immovable Property Act 1994 is the main legislation used for land acquisition, it has shortcomings that may hamper the proper resettlement and rehabilitation of the affected people." [ESIA volume1, Chapter 2, page 12]. "Most important," the report continues, "this Act does not make provision for:

1. compensation to be calculated at replacement cost;
2. persons without legal title to the land they occupy; or
3. the means to support proper resettlement and the restoration of livelihoods"

[ESIA vol 1, Chapter 2, page 12].

Perplexingly, the ESIA then goes on to assert that "sufficient information and assessment has been undertaken to demonstrate that viable settlement design [associated with] coal transport operations are available." It refers the reader to Volume 1, Chapter 11 ("Ancillary Development") - a mere 13 pages which, in turn, invites examination of volume 1, chapter 10 ("Socio-Economic Assessment"). There it is admitted that: "Although all affected households will be compensated for land losses according to the Project's Entitlement Matrix…limited land availability in the region could mean that the unit of farming land available per family will decrease (sic). Given that there is a strong correlation between the incidence of rural poverty and land ownership (World Bank and ADB 2002), access to cultivable land and important natural resources are a key determinant in the Study area and a reduction of this land will have a negative impact on households." [ESIA vol 10 page 17; see also ESIA vol 4, section 1]. Indeed, "[n]otwithstanding the changing role of agriculture in rural Bangladesh, it remains a key economic activity in the Study Area. For many households it is an essential, although no longer a sufficiency factor in their survival" [ESIA vol 1, chapter 8, page 33]. In a sampling of households belonging to the study area, "[m]ore than 45% reported earning income from the sale of agricultural products" [ESIA vol 1, chapter 8, page 45].

We are left in no doubt that "[t]he Project *will* cause additional removal of agricultural and forested land by clearing of the Mine Footprint, as will the Phulbari Power station."
[ESIA vol 1, chapter 12, page 12]. Furthermore, "[t]he removal of productive assets…such as standing crops, trees, ponds, dighis [small reservoirs] tube wells…*will* result in a loss of their subsistence and associated income-generating potential and *will* therefore have long term negative impacts on those affected [*author's italics*]. It is not possible at this stage to precisely identify the number of productive assets that would be lost." The report also concedes that: "Resettled households may not have access to the same range or quantity of resources at their new site or may find themselves in competition with host communities over utilization of these resources [ESIA vol 1, chapter 10, page 21].

Paragraph 6 of the SEIA states that. "[t]he [Project] area is among the poorest in Bangladesh". However, the statement appears to be qualified (if not belied) a few paragraphs later [19]: "Most plots [within the Project area] are harvested two to three times per year [while] flooding is rare…" In addition [para 20] it is noted that the area has "moderate faunal and floral diversity, including 89 fish species". It seems clear, therefore, that the area is not agriculturally or biologically impoverished; nor is it subject to the ravages of flooding characteristic of much of the rest of Bangladesh.

Notwithstanding this, average poverty levels are greater than in other areas of Bangladesh – which is why the project must at all costs prevent a reduction in the sources of sustainability, not only in the long term (post mine closure) but at all stages in project "development". Crucially this requires a guarantee that, even for a relatively short period, such means of subsistence already employed should not be infringed upon, while new ones are generated (such as supplying cleaner water to increase fish stocks) in order to contribute further value, and by generating long term (not casual) employment at the mine and its associated activities . (See also section 1.11 below).

The SEIA (paragraph 279) estimates the "maximum net loss in agricultural production over the project's lifetime [to be] 17%". This is highly significant for an area of the country that has been relatively free of the climatic disasters that have wreaked havoc on agriculture elsewhere in Bangladesh, and in view of the 36-year design period of the mine. The degree of such loss is compounded by the fact that close to 20% of the mined-out agricultural land will apparently be permanently forfeited [SEIA, para 276]. (Or, as the company prefers to represent it: "More than 80% of the agricultural land will be restored after it has been mined…net loss in value of the land is only (sic) USD 57 million" [ibid]).

In paragraph 112 of the SEIA, the company admits that: "A significant reduction in land acquisition and population displacement is not possible without compromising the economic and technical viability of the project." This encapsulates one of the project's key premises: that it is economically and technically viable as it stands, therefore any sacrifice of land, the creation of new hazards to the environment, and a disruption of existing livelihoods will be compensated for by delivering improved development to the country as a whole, in particular by "transforming" the north west region's predominantly agricultural base to an industrial one [SEIA para 1]. But, since there are major doubts about the validity of these assumptions, it may well seem that far too high a price is being exacted from those most vulnerable to the project's operations. For example, "[o]f the 2,436 households surveyed [in the mine study area] 127 physical disabilities were recorded…typically as a result of illness." [ESIA. vol 1 chapter 8, page 77]. These are conditions that "it were (sic) considered may be exacerbated by either living in the proximity of the Project or being employed by the Project" [ibid].

1.11: Employment: a Numbers Game

As noted earlier, the underground alternative to open pit exploitation of the Phulbari deposit has been dismissed on flimsy, if not tendentious, evidence. Thus, no evaluation has been made of the number, and sustainability, of jobs that would be available in an underground mine. However, neither option would appear to enhance employment prospects for local people. The ESIA claims an objective of "maximizing direct and indirect benefits to local and regional economies" [ESIA vol 1, chapter 6, page 1] and a long term aim that the project workforce will comprise mainly local residents. (Under the company's contract, both Asia Energy and its subcontractors are

"required to preferentially employ Bangladesh nationals" [ESIA vol 1, chapter 5, page53]). But no timeline is given for this: we are merely offered a vague assurance that "ultimately at least three quarters of the workforce will be local" [ESIA vol 1, chapter 6, page 52]. The adverse socio-economic consequences of utilising a largely-imported workforce - cultural frictions, competition for housing and services, rises in local commodity prices (all contentious features of similar projects) – are not addressed.

Between 1,200 and 2,100 full time jobs are projected in total for the mine, and Asia Energy seeks to affirm that "many other jobs will be created" [SEIA paragraph 275]. It claims that, by allowing "for a multiplier of 10 additional jobs for every direct job in total, the Project can create more than 20,000 new direct and indirect jobs" [ibid]. This is wildly over-optimistic, and the project's main external consultant, SMEC International, bears that out. In making comparisons with similar large mining operations, SMEC puts the figure considerably lower at between 4 and 8 new jobs created "in the area" for every direct job [ESIA vol 2, chapter 1, page 129]. Such a level of employment is highly unlikely to meet the need to find jobs for many of the approximately 50,000 people who, by the conservative estimates of Asia Energy itself, will be displaced by the project.

1.12 Additional Value?

One of Asia energy's "selling points" has been the prospect that secondary materials extracted during the coal mining process – sand, clays, silica, rocks, gravels – will boost a secondary market, thus generating additional income [ESIA vol 1, chapter 1, page 12]. GHD is considerably more cautious in its evaluation of this possibility than Asia Energy seems to be. "There is potential for industrial minerals to be extracted as co-products", acknowledges the consultancy, "...and preliminary estimates indicate that up to 33% of non-coal material mined could be used in various local industries" [ESIA vol 2, chapter 2, page 81]. However, GHD also warns that there is a high level of iron in much of the Dupi Tila clays, rendering most of it suitable only for lower-grade pottery [ibid, page 76]; equally important that "because of the abundance of Pyrite in this product there will be acid emission issues to be resolved" [ibid].

1.13 Water, Water Everywhere – but How Much to Drink?

Since October 2006, the leading Canadian multinational mining company, Cameco, has suffered massive seepages of underground water into its operations at Cigar Lake, Saskatchewan – the world's biggest high grade uranium mine [see: Dorothy Kosich, "Water inflows halt Cameco's Cigar Lake uranium project yet again", Mineweb, 13 August 2008.] This is but one example - though a signal one - of failures to anticipate the movement of water into, or within, ore seams once extraction has commenced, and regardless of whatever hydro-geological investigation has preceded it.

The prospect of flooding is but one critical part of the Phulbari project. The dewatering strategies required to access the coal in the first place, and the compensatory measures needed to ensure that recycled water, after adequate treatment**,** reaches local people are equally, if not more, important. While the ESIA notesthat "the overall majority of households (78%) [in the 10km square area of mine impact] reported that their [water] supply was sufficient", over 50% of families in Phulbari itself "disagreed" [ESIA vol 1, chapter 8, page 63]. Thus, any reduction in water supply, its quality, or access to it, will have serious consequences, especially for those

supposed to benefit directly from the project. Already some Bangladesh authorities have warned that underground water levels are gradually falling in the country's northern region, including Dinajpur district where the mine is to be located, while the supply is not being replenished by regular seasonal rainfall. [sources cited by Engr. A K M Shamsuddin in "Phulbari Coal: Hydrogeological environment not favourable for open pit mining", The Daily Star, Dhaka, 29 September 2007].

To date, trials to test the feasibility of re-injecting and infiltrating water have still to be carried out. It is likely that, even with the planned forty seven re-injection wells, the water table will be lowered to a degree that cannot be fully compensated for. An important point is that a fully-functioning model of how this intricate system of checks and balances will operate has not, apparently, been performed.

River waters adjacent to the mine site might also become affected. The SEIA [para 95] states that: "Should monitoring indicate that [these] rivers are adversely affected by dewatering activities…water will be released to the surface body from the mine water dewatering system to maintain the current seasonal water levels and quality". However, this assertion just cannot be made in light of the uncertainties surrounding the lack of a functional water management plan. Also left to speculation is the precise quality of the water when removed from the mine. This may contain acidic or toxic materials, and will certainly require some treatment before being released for household, and probably even agricultural use.

The success of the mine is contingent on a huge number of practical measures to change the hydrology of the mining-affected area, not just its "footprint." If the avowed aim of delivering better quality, and more accessible, water supplies for local residents and agriculture is to be fulfilled, proper implementation is required – and at the right time – for all these measures. Failure of one aspect could precipitate failure in others, despite a few modifications already made to the original mine plan and the sequential nature of extraction (north to south) currently envisaged.

Essentially, the key challenges are to dewater the pits and tap the aquifers; ensure adequate clean water supplies by re-injection for local usage (including agriculture and fisheries); siphon excess water (including direct rainfall) to local rivers; divert the current flow of the Khari Pul river (to the east of the deposit) where "the ex-pit overburden dump will be placed in its flow [SEIA Appendix 1, para 6]; control potentially damaging seepages from overburden, coal dumps and other runoff from the pit; install other drainage systems; avoid discharge of waste water containing high levels of suspended solids or with heavy sediment loading; neutralise other harmful effluent discharges; and supply adequate water for mine operations themselves (coal washing, spraying of roads and abatement of fire hazards – including possible spontaneous combustion of coal. These are all potentially serious events which are barely addressed in the study; not to mention the hazards of acid rock drainage (see Section 1.14 below).

If the proposed mine-mouth coal-fired power plant eventuates, then the scenario will have to be dramatically revised, since the plant will, in itself, exert huge new demands for water – something not considered in the assessments.

Many statements in the ESIA (some quoted earlier) do not bode well for acceptable outcomes of such a complex undertaking. We are told, for example, that: "Environmentally Sustainable Development (ESD) solutions will be identified ***wherever practicable***…to ensure viable draining systems are implemented" [ESIA vol 1, chapter 4, page 37]. "Should monitoring of the aquatic ecosystem and fisheries …reveal unexpected adverse impacts from mine dewatering flows", we

are merely assured that "the mine infrastructure ***could*** be changed to redirect volume and the timing of the flows" [ibid page 40]. A viable ESIA must clearly state that there will be zero sum water discharge from outside the mine operations themselves, and that no water from the coal washing will be released to any natural water bodies. Just how the planned infrastructure could be altered swiftly to cope with any unexpected event, such as those described; and just where any excess flows could be directed, do not seem to have been considered

The UDT (Upper Dupi Tila) tract which underlies the coal deposit is a major regional, clean water, aquifer of 100 metres thickness, itself underlain by the LDT (Lower Dupi Tila). Dewatering here will require vertical bores, horizontal drains to relieve bore pressure, and in-pit channels and sumps to gather groundwater flowing into it [ESIA vol 2, chapter 1, page 38]. Yet, as of late 2005, "no specific aquifer tests have been undertaken to determine the potential leakage rates across the LDT due to drawdown in the Gondwana Group sequence[4] " [ESIA volume 2, chapter 3, page 31]; nor had any hydrological tests been conducted "to assess aquifer conditions and the required extraction is unclear" [ESIA vol 2 chapter, page 22].

Compounding this deficiency, GHD warned that differential lowering of groundwater levels "may affect the growth, vegetation and survival of plant communities adapted to local underground hydrology"; although "the exact nature and extent of effects is not known (sic) and could potentially lead to changes in species diversity and abundance of both fauna and flora species in the affected areas" [ESIA vol 3, chapter 3, page 135]. In light of these defects, the water balance report by consultants SWV in October 2005, purportedly updating the May 2005 findings of Coffey, and the September 2005 study by GHD, offered little new or substantial information; their study merely "***indicat[ing]*** that water will be available for all stated purposes throughout the year" [ESIA vol 2, chapter 8, page 18].

Diversion of the parts of the Khari Pul river which cut through the mine's "footprint" (euphemistically dubbed "realignment" by Asia Energy [ESIA vol 2, chapter 6, page 9]) is a potentially hazardous undertaking, the consequences of which are addressed ambivalently in the study (where they are addressed at all). On the one hand, we are told that "[t]he information [on the plan] available at present appears to be inadequate for concept or final plan and a further assessment of the adequacy of the available data is proposed" [ESIA vol 2, chapter 5, page7]. On the other hand, the final biodiversity study, carried out by NACOM, warns that "the Khari Pul and Namissa rivers…have biodiversity significance and therefore should be considered priority areas for conservation" [ESIA vol3, chapter 3, page 120].

The biodiversity component of the mine study states that: "None of the species recorded are endemic to the Study Area" [ESIA vol 3, chapter 3, page 121]. This should not be construed as a justification (let alone an invitation) to materially reduce the numbers or variety of existing fauna and flora (especially as some have not yet been fully recorded). The projected loss of habitat within the study area is considerable: 4,000 hectares of cultivated land; 672 hectares of harvested vegetation; 198 hectares of exotic plantation, 78 hectares of roadside vegetation; 75 hectares of wetlands and 8 hectares of sal forest [ESIA vol 3, chapter 3, page 132].

Although none of the "priority terrestrial habitat areas…are located within the mine footprint " [ESIA ibid], and it is considered "***unlikely*** [that habitat loss] would result in the loss of species from the wider area" [ibid page 133], nonetheless "[t]he Khari Pul has been identified as a

[4] The Gondwana group sediments consist of sandstone and mud which overlie the two major project coal seams [ESIA volume 2, chapter 2, page 97].

priority area for biodiversity conservation and therefore removal of a segment and subsequent diversion may impede drainage in the area which may affect the growth, survival and regeneration of flora and fauna" [ibid]. In addition, "a number of wetland areas …should…be protected as far as possible from mining activities", while "[b]eels within the mine footprint should be preserved ***wherever possible***" [ibid page 136]. The ESIA invokes policies of "replacement", habitat "enhancement", and provision of "compensatory pools" (in the case of affected bheels) to address potential deficiencies. However, we can hardly be sanguine that these remedial undertakings will be implemented in a timely fashion, or to the extent necessary. In any case, their implementation would inevitably extend the mine's "footprint", thus potentially worsening the impacts.

1.14 Failures to Identify and Prevent Acid Rock Drainage

ARD (or Acid Mine Drainage-AMD) is the malignant process whereby sulphide bearing minerals/iron pyrites becoming oxidised in water, producing sulphuric acid which has the propensity to leach heavy metals into the environment. It remains "the most serious long-term environmental issue for the metals and minerals industry worldwide" [Mining Environmental Management, London, May 2004, page 8]. Some instances of mining-derived AMD/ARD have persisted for decades, and not only at abandoned mines. For example, it is predicted that the currently operational Ok Tedi (OTML) copper-gold mine in Papua New Guinea will continue to deliver AMD to the vital Fly River system for a least 100 years, despite "best practice" on the part of the management [See statement by Keith Faulker of OTML, cited in "Acidic Exposures" Post Courier, Papua New Guinea, 8 February 2006].

The Phulbari assessments do not regard the likelihood of AMD with anything approaching the seriousness it demands. Astonishingly, the ESIA admits that "the potential for AMD has not been adequately assessed and risk analysis still has to be done" [ESIA vol 2, chapter 6, page 30]. The SEIA simply says that "a number of acid mine drainage mitigation strategies" will be "instigated" (a curious phrase) and that "monitoring of water will be part of the EMP and will determine if additional treatment is needed" [SEIA para 93].

In addressing Acid Mine Drainage Impacts of the Phulbari project in September 2005 GHD pointed out that a "significant percentage of the overburden material [at the minesite]" is "considered to have a high risk of producing AMD." In particular: "It is expected that a significant proportion of the LDT (Lower Dupi Tila) unit will be categorized as high risk with respect to AMD potential and will require special containment" [ESIA vol 2, chapter 3, page 41]. GHD found "wide variation both laterally and vertically " in AMD during its sampling of Phulbari coal, most of the acidity being "caused by pyritic sulphur of up to 1%" and " in part with some local extremes of more than 2%". It weakly offered that "some blending [of coal] will be necessary". [ESIA vol 2, chapter 2, page 99]. In addition, "while Fe2O3 [ferric oxide] contents are usually below 4%, values of more than 10% may occur", along with high pyritic sulphur content [ibid, page 101]. Rightly, GHD points out that: "The high levels of Total Sulphur (ad) are a major cause of concern. Usual percentages are between 2% and 8% but a number of results above 20% have been found [in the samples]" [ibid page 166]. The basic message here is that AMD remains one of the greatest sources of long-term damage to the environment.

AMD will potentially derive not only from the mined coal but also coal washery tailings and overburden dumps, which will contain other rejected hazardous materials. GHD recommends that the tailings be "specifically managed" by dewatering them to reduce availability of water

causing acid formation, encapsulating them within benign clays and disposing of them in "packets" in the pit at " a level below the permanent water table to reduce the likelihood of oxidation " [ESIA, vol 2, chapter 6, page 29]. Just how this intricate strategy will be engineered is left to speculation, as it does not seem to have yet been devised, much less budgeted for.

The methodology for dealing with pyritic and other hazardous materials from the mine is to "encapsulate" them within "at least 2 metres of compacted clay or another impermeable material." This will include the overburden dumps. [SEIA Appendix 1; see also ESIA vol 1, chapter 1, page 75], but apparently not address potential AMD from ongoing operations at the open pit itself, except insofar as high acid generating material will be consigned to dumps whose location is yet to be decided. This lack of certainty in the plan is worrying: the nature of "encapsulation" required can only be determined when a thorough analysis is performed on the materials to be "encapsulated." For example, synthetic (HDPE/high density polyethylene) or bentonite liners and covers may be necessary to avert leaching.

Measures to combat AMD employed at some other mines are certainly more sophisticated and better monitored than those so far envisaged for Phulbari[5]. Even so, they are by no means foolproof in actual operation, especially under extreme weather conditions (such as heavy monsoons) or as a result of ground shifts or high seismic activity (see below). This is acknowledged in GHD's study which supports an overall height of 120 metres for the overburden dump - so long as the slope from crest to toe "is marginally under 15%" [ESIA vol 2, chapter 3, page 10]. But the consultancy stresses that there must be "good drainage practices…and maintain[ance of] graded angles to avoid ponding of waters adjacent to the dumps…the strength of the MPD (Madhupur) clay has a major influence on the stability of the dump" [ibid].

Even if the exact nature of AMD-producing materials is determined, there is no guarantee of success for any of the methods currently used elsewhere to cope with, or inhibit its production. Both the Ok Tedi experience (above), and recent collapses of waste piles and overburden dumps at other mine sites (e.g. at the Lihir mine in October 2005 [see Ben Sharples, "After the Lihir landslide" Miningnews.net, 14 October 2005]) give little cause for comfort.

1.15 When the Earth Moves

Notwithstanding the best-laid plans of mines and men, ground subsidence compounded by lack of (or failures in) drainage [ibid page 73] and proper slope maintenance (both in the mine workings and dumps), could have serious consequences. "Subsidence of the existing ground surface levels

[5] Rehabilitation, using engineered dry covers on potentially acid producing waste rock at the recently-closed Kelian gold mine in East Kalimantan, involves the compaction of three types of material, placed in 1.0 metre thick layers; the first an impermeable layer of saturated and compacted muddy breccia which seals the dump, and prevents oxygen from entering the sulfidic waste rock; the second a blocky andesite, to act as a root break; and the final layer consisting of "growing media" suitable for revegetation. Both temperature and oxygen within the dump are regularly monitored to determine if acidification is still occurring below the engineered layers, and monitoring is to continue for five years after closure [G McGuirel, "Managing Mine Closure Risks in Developing Communities — A Case Study, Kelian Equatorial Mining, Indonesia", paper delivered at the Mining Risk Management Conference, Sydney, NSW, 9-12 September 2003].

can be expected to occur as a result of mining activities. Subsidence around the proposed open pit mine is anticipated due to large scale dewatering of the UDT sand, aquifer depressurization and consolidation of LDT clay and MDT clay . . . [which] can lead to significant subsidence via several mechanisms…" [ESIA vol 2, chapter 3. page 13]. Such subsidence is most likely to occur due to mining of the aquifer - and in this regard GHD strongly criticises the current mine plan: "At Phulbari large-scale aquifer depressurisation during mining operations is likely to result in significant land subsidence" [ESIA vol 2, chapter 3, page 91]. While "the proximity of the Little Jamuna River to the west of the mine will have a positive influence by reducing settlement" (though only in this direction) "…some management of the river by partial lining or additional pumping stations will be required to protect the stability of the western mine batters…" [ibid]. Additionally, "monsoons pose a risk to [topsoil] Stockpiles" [ESIA vol 2, part 2, chapter 6, page 21].

Equally, if not more important, none of these temperate coal-mining areas evince the potential for a major seismic event. Yet, Dinajpur district (in which Phulbari resides) is "seismically active with… earthquakes occurring every two years on average." Assuming a 50-year LOM (life of mine) for the Project, GHD concludes that there is "a 10% probability (sic) of seismic occurrence which would cause significant damage."

Asia Energy cites two current models of existing open-pit/strip coal mines in an attempt to reduce anxieties about subsidence at its Phulbari project. One is drawn from the Hunter Valley area of Australia's New South Wales (see below: "Air quality"); the other is the Rheinbraun operations of RWE in Germany [ESIA vol 1, chapter 5, page 9]. In evaluating possible subsidence at Phulbari, GHD compares that at the Rheinbraun site with what has occurred in Australia's LaTrobe Valley: "Subsidence per pressure drops at the Rheinbraun site are much less than in Latrobe Valley, due to presence of large quantities of sand which do not settle much, while LaTrobe Valley stratigraphy is dominated by clays", comments GHD. However, "[s]tratisgraphic and hydrogeological ground conditions at Phulbari fall between the two sites mentioned, with sands dominating the upper 100m being underlain by approximately 70m of clays" [ibid]. Clearly, comparison between Rheinbraun's operations and those planned for Phulbari are distinctly questionable.

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This is far too significant a probability to be dismissed; the company has not given it anything approaching the attention it deserves. Mine design components – such as berms, batters, clay covers and lining of potentially acid-creating spoil heaps, sloping and vegetation of dumps and workings, backfilling of pits, etc – would be completely insufficient to cope with such a sudden event, let alone a series of them

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clay covers and lining of potentially acid-creating spoil heaps, sloping and vegetation of dumps and workings, backfilling of pits, etc – would be completely insufficient to cope with such a sudden event, let alone a series of them.

1.16 Air quality Impact: an Unhealthy Proposition

The admission is striking: "The cumulative impact of the implementation of the mining and energy sector projects is an increase in emissions of airborne particulate matter [PM] in an environment clearly exceeding GoB standards, with subsequent increase in public health and environmental impacts" [ESIA vol 1, chapter 14, page 5]. Use of Phulbari coal to fire brick kilns - cited by Asia Energy as one of the potentially re-generative industrial applications of the Project - is also thrown into considerable doubt, the ESIA concluding that "already particulate matter concentrations are too high [in the area] due, in part, to brick kilns" [ESIA vol 1, chapter 7, page 25].

However, instead of subduing public apprehension on these counts through diligent evaluation of likely levels of particulate matter (PM), or total suspended particulates (TSP), generated by the Project, we are asked to judge by "experience" from the Hunter Valley region of New South Wales, Australia, which "***suggests*** that particulate emissions and their cumulative impacts on air quality can be managed, but require strong environmental commitment" [ESIA vol 1, chapter 12, page 15].

This optimism is unwarranted. A 2006 report by the Environmental Defender's Office Ltd (New South Wales) concluded that: "In relation to coal mining in the Hunter Valley, the Metropolitan Air Quality Study (MAQS) identified that mining is a significant source of TSP (50µm or less), contributing 26 percent of human sources in the greater MAQS region." This is a reference to suspended particles derived from human activity – factories, mining etc. In addition, the [Australian] National Pollutant Inventory (NPI) estimated the mass of PM10 emissions, due to coal mining in the Hunter Valley area for the period 2003 – 2004, as 42,000,000 kg. A more recent study in the Hunter region identified soil particles as making an average contribution to the total ambient level of fine particles in the atmosphere of about 10 percent and 22 percent for PM2.5 and PM10 size fractions respectively.[6]

The NPI also "estimated the mass of emissions to the air of toxic metals and their compounds, due to coal mining in the Hunter Valley area for the period 2003 –2004, as between 14kg and 55,000kg. These metals included arsenic, antimony, cadmium, chromium, cobalt, lead, manganese, mercury, nickel, selenium and zinc [Technical Fact Sheet: Air Quality – Dust Monitoring (2006), Environmental Defenders Office, NWS, Australia]. See: http://www.edo.org.au/edonsw/site/pdf/scifs/sfs_air_quality_dust060405.pdf][7]

[6] The majority of dust generated by mining is typically derived from soil and rock which contains particulate matter, classified according to its size. Thus, PM10 particles are 10 micrometers or less; PM2.5. particles are 2.5 micrometers or less. The former is known to cause, or contribute to, bronchial and lung infections; the latter can create multiple health problems, including cardiovascular and heart disease, asthma and other respiratory malfunctions, especially in young children.

[7] Although not dis-aggregated, the Hunter Valley figures are disturbing. Even very low levels of lead are now considered potentially harmful to growing children, while there is increasing evidence that exposure to any dose of mercury fails the NOEL (No Observable Effect Level) used in toxicity testing.

Such levels give cause for alarm. However, the Phulbari ESIA ignores a comparable estimate of toxic metals which may derive from the project's coal.

Major airborne pollution will inevitably also derive from the rail-river-coastal transport sectors of the overall project; not only from PM, but also gaseous air emissions, NOx (nitrogen oxide), CO and SO2, albeit "to a lesser degree" [ESIA vol 1 chapter 8 page 11]. Air particulate concentrations in parts of the rail corridor (both PM 10 and PM 2.5) are predicted as "likely to exceed the GoB (Government of Bangladesh] ambient air quality standards" – except during monsoons. [ESIA for Coal Transportation, chapter 7, pages 7 &14]. Existing background air particulate concentrations around the Bhairab coal terminal already "do not meet the GoB ambient air quality standards", other than during monsoons. [ESIA vol 1 chapter 9 page 7]. Total PM10 emissions from all the coal transported by rail are estimated at 193 tonnes a year, while PM2.5 – the highly critical contributor – could amount to 39 tonnes a year [ibid]. These troubling levels are dismissed as "***unlikely*** to be significant" if "controlled." [ibid page 12]. Yet, in the same breath, we are informed that "[w]hile locomotive engine emissions are unlikely to result in local air quality impacts, *the emissions will contribute to national and regional emissions. This is particularly important for PM, as it is the major pollutant of concern in South Asia.*" [ibid, page 11, *authors italics*]. In recent years, much of the subcontinent has been profoundly affected by what its commonly called "the Asia brown cloud", to which increased industrial activity (including transportation and the burning of fossil fuels) makes the most significant contribution. However, nothing is offered to justify this excess in relation to the Phulbari project. The omission is all the more reprehensible, given the additional failure to adequately assess PM concentrations caused by the mining itself.

1.17 Sacred Spaces: Impacts on Archaeological and Other Sites of Significance

There are no less than 211 mosques, 172 Hindu temples, and 19 churches, identified within the 5 km mine impact zone, together with 1,537 graveyards and cremation sites [ESIA vol 1, chapter 8, page 83]. Additionally the study identified (in April 2006) some 79 archaeological sites, of which the 19 Ancient sites "were [all] determined to be of archaeological interest" [ibid, page 82], although "the most historical and culturally significant sites occur outside the Mine's Footprint." Nearly 40% (31 sites) were deemed "removable…after discussions with local people" [ibid].

The ESIA does acknowledge that "[L]and acquisition and project development activities will have impacts on the archaeological, historical and religious sites, and graveyards and cemeteries that are located within the Mine Footprint" [ESIA vol 1, chapter 10, page 83], and that the mine "may potentially result in damages to [these] sites and structures or degradation of their cultural value" [ibid]. Nonetheless, there seems to be little recognition of the sensitivities required in removing such sites (essential for the full mine plan to be implemented), or the difficulties in negotiating such removal.

The "relocation" of sites of spiritual significance (a phrase not employed in the ESIA) is one of the most contentious faced by mining companies; having provoked bitter conflicts in Aboriginal areas of Australia for at least thirty years, more recently in south eastern Madagascar and India, and - just two months ago – in South Africa's Limpopo province, where Anglo Platinum removed graves to improperly "reassemble" them at another location [see: http://www.minesandcommunities.org/article.php?a=8669]

1.18 Post-mine Rehabilitation: no True "Closure"

Driven to a large extent by community concerns (and often outrage) at the breaking of promises made by mining companies and administrative authorities to "return" mined-out areas, and other disturbed parts of an ex-mined "footprint", to a state comparable with – or better than – prior to mining, numerous experts have developed post-mine rehabilitation standards, though many of these remain legally un-enforceable. The latest essay at summarising these standards was recently been published by the ICMM [International Council on Mining and Metals, August 2008]. Few would disagree with the World Bank's objective that mining-impacted land and water bodies should be restored "to conditions capable of supporting prior land use or uses that are equal or better to [sic] prior land use…and eliminate[e] significant adverse effects on adjacent water resources" [ESIA vol 2, part 2, chapter 6 page 7]. But the precept comes with a major caveat: such measures are executed only "to the extent practical" [ibid].

Nor does the precept account for the economic, biodiversity, agricultural and other values or opportunities, which will be lost during the mining operations themselves, however resourceful or ingenious the attempts to compensate for those sacrifices. The Phulbari mine development plan has the avowed aim of "rehabilitating… disturbed areas . . . in a progressive manner throughout the life of the project" [ESIA vol 2, part 2, chapter 6, page 8]. There is little evidence that the project managers, and other agencies involved, have the capacity to ensure that the proposed measures work, or to monitor consistently the plethora of project impacts already outlined. Current mine closure "best practice" does include most of the steps prescribed for Phulbari. But many of these are severely circumscribed in the ESIA. They fail several key minimum requirements: that each measure must be mandatory, with an agreed time framework for implementation, performed by specially trained personnel, with a clear monitoring programme, and budget guarantees.

It is thus totally unacceptable to be informed that "natural drainage patterns disrupted by mining should be reinstated ***wherever possible*** [ESIA Vol 2, chapter 6, page 8]. Or that potentially acid-generating tailings from the coal washery will be "placed at a level below the UDT strata" – but only ***"where possible***" [ESIA vol 2, part 2, chapter 6, page 29]. Or that, while topsoil will be replaced "immediately on an area where the rehabilitated landform reconstruction is complete", once again this will only occur "***where possible***." [ESIA vol2 part 2, chapter 6, page 21.]

Soils in the study area are considered "suitable for cultivation of most climatically adapted crops". Yet this regeneration will be dependent on "**site constraints**" – and these are still to be "diagnosed and appropriate amendments made" [ESIA vol 1 chapter 8, page 12].

The final post-closure plan includes provisions for reclaiming 1, 946 hectares of native forest [ESIA vol 1, chapter 5 page 6]; re-generating agriculture and restoring water resources; instituting a migratory bird/wildlife area and a forest corridor between the overburden dump and Ashoor beel; and flooding the mined-out pit for fishing recreational and other activities [ESIA vol 1, chapter 8 page 12]. Backfilling and re-vegetation of the spoils is to be conducted as extraction proceeds, with various levels of wastes placed in ex-pit or in-pit overburden dumps, purportedly "sealed" with clay and a thin (sic) layer of topsoil to grow an "agreed combination of cereal crops, fruit or timber trees and native vegetation" [ESIA vol 2, part2, chapter 6, page 21]. The ex-pit overburden dump area (ODA) will be "developed as a nature reserve….down to the Khari Pul river" [ESIA vol 2, part 2, chapter 6, page 29]. It is true that some of these post-mine reclamation measures have succeeded in temperate climes with stable rainfall patterns and soil structure (such as the Eden Project, constructed on the worked-out china clay mines of Cornwall, UK) But they are all highly inadvisable for a seismically active monsoonal region.

PART II: Coal Transportation ESIA

2.1 The High Risks of Under-estimating "Risk"

The so-called coal "transport corridor" is designed to use the existing rail system between Phulbari and Gazipur, Darsana and Khulna's Bhairab terminal. From Khulna, a barging "corridor" will extend south down the Pussur River, 107 km to Akram Point in the Sunderbans Reserved Forest (SRF) [ESIA coal transportation, chapter 6 page9], then further south along a shipping channel in the Bay of Bengal [ESIA for coal transportation, chapter 1, page 5].

This would be a testing venture under the best of regulatory regimes. It is scarcely reassuring that, in this case, "environmental management responsibilities and implementation will be at the discretion (sic) of the GoB", with only a short time frame provided for "detailed or optimum environmental and social investigation", or "for monitoring to account for seasonal and other temporal changes" [ibid page 9]. Anyone who has inspected coal transport facilities around the world as this author has done in Indonesia (Kaltim Prima), India (Sarshatali, East Parej) and Colombia (El Cerrejon Norte) knows full well that, even at the best designed operations, prospects of failure are real and ever present: ranging from seepages of coal dust from over-laden bogies, to heavy emissions of particulate matter at stockpiles and off-loading points, to the derailment of entire trains, major riverine and coastal collisions, and the capsizing of a vessel, resulting in the spilling of all diesel fuel and cargo.

The current scenario envisages up to 11 trains a day departing the mine area, each of which could stretch to 1,100 metres in length [ESIA Coal transport, chapter 6, page 7]. This is almost double the length (560 metres) of the largest trains operating in Bangladesh at the time of the study. "Road/rail safety impacts associated with rail transportation" are judged to be "significant", requiring defined mitigation measures [ESIA chapter 8, page 31], although mandatory covering of the wagons, to reduce dust and PM emissions, does not appear to be one of them. Paragraph 27 of the SEIA states that the Bhairab coal terminal will receive an estimated 5 trains a day taking 3 hours each to unload, while barge loading will take around another 12 hours [ibid]. The trains will arrive at the terminal via the main Khulna-Jessore line, passing through more than 500 km of land [SEIA paragraphs 21, 22]. It is asserted that the Bangladesh railway network can accommodate this major additional pressure with "minimal interruptions to traffic." [SEIA paragraph 120] This is highly over-optimistic, especially as the line will require upgrading "in certain areas" [SEIA para 9], the extent of which "will only be determined during the detailed design phase" [ibid].

In theory, technical measures can be adopted to prevent some (though by no means all) such impacts, by measures set out in chapters 8, 10 and 12 of the ESIA coal transport study. In practice their successful implementation depends on fallible human beings, directed by agencies which can act with authority. Such authority, in respect of rail upgrades and resettlement "transfers", mainly rests with Bangladesh Railways [ESIA coal transportation, chapter 8 page 7.] Asia Energy is to "operate" and "control" the coal offload terminal [ESIA coal transportation, chapter 13, page 6]. But beyond these parameters the lines of responsibility for formulating and implementing mitigation measures are unclear, and dependent on "indirect (sic) control" through what is dubbed "influence" (sic). Thus, the company will have "*indirect control through influencing operations via the administration of contract arrangements*, including barging and shipping operations" (*author's italics*), and through "the use of government provided services such as the national rail network and developing the 'Outer Bar' south of Hiron Point" [ESIA

coal transportation chapter 14, page 5.] There is a manifest oxymoron at play here: control can only be exerted directly, with any mishaps being placed squarely at the company's door. Or else, it cannot be claimed to exist.

The Construction Environmental Management Plan (EMP) for this complex component of the Project is still to be developed [ibid]. Given that no political decision has been made as to exactly how much coal will be consigned to transport outside the mining area, or what proportion of this will be exported to India and to other international customers (see Part I above), it is clearly not possible to devise such a management plan at present. What this means, however, is that all study estimates of potential pollution, accidents, amount of land and water affected, are speculative.

We are told throughout the coal transportation ESIA that such risks are minimal or "unlikely to be significant" [ESIA coal transportation chapter 8 *passim*]. The risks were evaluated through a number of inter-disciplinary workshops [ESIA coal transportation, chapter 13, page 6] and some of their conclusions paint a far less sanguine picture. Although any coal spillage into the river "was considered to have only a marginal severity on the environment," the likelihood "was assessed to be frequent/repeatable, classifying this potential impact as an 'extremely high risk'," [ESIA coal transportation chapter 13, page 16]. (This level of risk was graphically demonstrated in July 2008, when a chemical tanker and a fuel barge collided on the Mississippi River in the US, causing the spill of more than 400,000 gallons of fuel oil and necessitating the closure of a 29-mile stretch of the waterway around New Orleans [US Coast Guard spokesperson, quoted in PlanetArk, 24 July 2008]). Worse, the "potential impacts from human injuries or fatalities" – caused by transporting the mined product by train – were rated as "extremely high risk…before application of mitigation measures" [ESIA coal transportation, chapter 13, page 5].

2.2 The Sunderbans Factor: Potential Impacts on Wetlands

The ESIA recognizes that "some coal may be spilled into the river at Akram Point during transfer of coal between barge and ships. Immediate impacts could include contamination of the water column with coal particles and an increase in turbidity and dissolved oxygen. Other impacts could include localised changes to salinity and pH of surrounding waters" [ESIA vol 2, part 2, chapter 6, pages 16-7; see also ESIA for coal transportation, chapter 8, section 2.2; and Project EMP, ESIA volume 4, chapter 1]. The "likelihood of a collision between a Project barge and a local vessel" – between Khulna and Akram Point - is assessed as "occasional/sometimes" (sic). Nonetheless, "the severity of the consequence was assessed…to be 'critical'" (ibid, page 18]. Estimated as another "extremely high risk" is an oil spill occurring while boats are re-fuelled at Akram Point, with the prospect that the fuel could enter and contaminate the Sunderbans Reserved Forest (SRF). This is considered "one of the most significant issues associated with the Project [ESIA for coal transportation, chapter 12, page 32.] while the risks would only be mitigated to a "tolerable level" - and then only by adopting "best practice measures" [ibid, page 13].

There are to be Shipboard Oil Pollution Plans, and Oil Spill Response Readiness procedures [ESIA ibid, page 32.]. However, these procedures are not *per se* pre-emptive; they merely comprise a framework for Response – such as by setting up an incident classification and reporting system, and training of ships' crews. They do not address sudden disasters due to human error – such as an oil spill while vessels are refuelling, as mentioned. Nor can they hope to cope with major climactic events, such as the tsunami of December 2004 which had direct

impacts on the coastal and shipping waters of the Bay of Bengal. (Curiously, this major disaster is not even referred to in the ESIA).

No doubt we are meant to be re-assured when told that "the closest point of the proposed shipping channel will be approximately (sic) 4 km (sic) from the shore of the protected [SRF] World Heritage Area (WHA)." [ESIA for coal transportation, chapter 12, page 45]. Or that "as the proposed dredging route is outside the boundary of the Sunderbans…the impacts on coastal processes (sic), salinity and suspended sediment have been found to be minor" [ibid]; consequently "direct impacts to the biodiversity of the WHA are ***unlikely*** to arise" [ibid]. These are just two examples of the type of (almost literally) "wishy washy", reckless and negligent thinking which permeates much of this part of the assessment.

Ironically it will alarm many people (and not just marine conservationists), precisely where it is intended to set their fears at rest, by positing an intrinsically unacceptable notion of acceptable risk.

"Risk" assessment is always problematic and often contentious, while attempts to define the nature of a specific residual risk may simply raise further unanswered (or unanswerable) questions. The classification provided of "extremely high risk" is one which "cannot be justified save in extraordinary circumstances …whatever the benefit" [ESIA for coal transportation chapter 13, page 5.] (Footnote 8) What then is considered an "extraordinary circumstance"? We are not informed. Nonetheless, a "high residual risk" (one notch lower in impact than an "extremely high risk") is to be "considered tolerable only if overall benefit to the Bangladesh people or GoB exceeds the high residual risk of the individual activity…" [ESIA for coal transportation, chapter 13, page 6].

As it stands, this pretended criterion is nugatory or worse - an invitation for vested interests to pre-empt a democratic and inclusive public process of determining which risks are acceptable. A major fuel spill contaminating the Sunderbans Reserve Forest (SRF) would certainly not be considered justified or acceptable by fisher folk in the area, or national and international conservation groups, as a "trade off" for "benefits" gained by exporting coal to foreign markets. The risk criteria therefore beg the essential question: risks for whom and at what cost?

In fact, those advancing the definitions of risk appear to have doubly "shot themselves in the foot." First, they state that, "[d]ue to project time constraints (sic) it was not possible to undertake further workshops to iterate the process of defining residual risks and verifying (sic) mitigation and management measures." [ESIA for coal transportation, chapter 13, page 7.] Put bluntly, the risks inherent in this crucial component of the project failed to be adequately quantified, so no pre-emptive measures were forthcoming. Apparently recognizing this, and "[t]o ensure risks were not underestimated as a result of time constraints, the 'precautionary principle' was applied and a conservative approach was applied by DNV to the classification and ranking of residual risks" [ibid.] This is an admission of no-confidence that mitigation measures will be implemented to prevent extreme or critical events occurring. It drives the proponents to adopt a superficially conscientious application of the precautionary principle. However, the logic of this would require avoiding both the "high residual" and "extremely high risk" components of the transportation scheme; and this in turn would jeopardise virtually the entire transportation plan as currently conceived.

If we are still in doubt about the rigor of this analysis, then attend to what the ESIA predicts will happen in the case of what it terms "an absolute worst case scenario…where 500 tonnes of HFO (heavy fuel oil) are spilled and able (sic) to contact the shoreline, with little to no intervention

over 14 days" [ESIA on coal transportation, chapter 7, page 55]. In this event, "it is likely there will be damage to the SRF shoreline…likely to be spread over a distance of shoreline between four and 14 km long…it is assumed that there will be extreme mortality or severe damage to mangroves and other shoreline plant species…it is likely that full recovery of the site…would take approximately twenty years (sic). [ibid]

2.3 The Dangers of Dredging and Dumping

Transporting the coal by barge will necessitate dredging the river bed between Khulna and Akram Point, while the marine transportation component of the project will include "dredging a 43 km channel through the outer bar between Hiron Point and a relocated Fairway Buoy at the edge of the Swatch of No Ground" [SEIA paragraph 9; see also ESIA coal transportation, Chapter 6, pages 38 onwards]. What will this mean in terms of disturbance to the riverine and marine environment?

Along the Pussur river, "***[e]stimated*** dredging quantities are ***approximately*** 7.5 million m3 in the first year, reducing to and stabilising (sic) at approximately 3 million m3 in the fifth year [ESIA coal transportation chapter 6, page 41-42]. Increasing channel depth "may lead to a change in the salinity dynamics of the Pussur River" but these are considered "negligible" since this represents "only a 3-5% increase over national levels." [ESIA coal transportation chapter 12, page 11]. The ESIA concludes that "the quantity of sediment disposed of and the method of disposal would not significantly impact upon the marine or estuarine environment." [ESIA chapter 12 page 16.] Yet sea bed dredging will dislodge huge amounts of sediment – an estimated 30 million m3 in the first year alone [ESIA coal transportation, chapter 6, page 41]. This is bound to have adverse consequences for pelagic and benthic fish and other fauna; a point conceded when the ESIA admits that: "Oxygen depletion as a result of the release of organic rich sediment ***could result*** in suffocation of aquatic species, and may also deter migratory fish and other species from the dredging areas" [ESIA chapter 12, page 41]. (It should also be noted that red fiddler and hermit crabs are among the most important "building blocks" of Sunderbans food-chain fauna). The study goes on to claim that these impacts would be "temporary" (just how "temporary" is left to speculation), while at the same time acknowledging that the "smothering" of deep sea organisms would "be long term (sic) due to the need for on-going maintenance in the Swatch of No Ground".[8] [ESIA for coal transportation, chapter 12 page 41].

It is impossible to assess both the nature of, and how long-lasting will be, the consequences of such dredging. While "it is not anticipated that sediment across the Outer Bar (Swatch of No Ground) will be contaminated, direct sampling and analysis of sediments along the proposed dredging route has not been undertaken to date" [ESIA chapter 12, page 13] Despite this deficiency, it is claimed that: "Over a five-year period, around 72 million tonnes of sediment from the dredged spoils will be dumped into (the ESIA euphemistically says "over") the Swatch of No Ground, at a depth below 90 metres CD [chart datum]", with "approximately 33% suspended in the water column" [ibid].This is said to be "negligible" compared with "the 200-500 metric tonnes per year of sediment discharged to the Swatch…from the Ganges-Brahmaputra-Meghna river" [ibid] In fact tthe comparison is spurious. It takes little account of the carrying capacity of the Swatch to accept these materials (which of its nature, defies accurate modelling,

[8] The Swatch of No Ground is a submarine canyon, just south of the Ganges-Brahmaputra river mouth, with a width of 6-7 km and an area of approximately 9,000 km2

especially as direct sampling and analysis of existing sediments has not been carried out); nor any critical "over-tipping point" that might be reached in doing so.

In similar cavalier fashion, the ESIA advances "results" – though based only on modelling - which "***indicate*** that sediment arising for dredging of the Outer Bar and spoil disposal at the Swatch of No Ground will have no impact near the Sunderbans [SRF]". At the same time, the report concedes the possibility of direct impacts of dredging on the World Heritage Area, merely assuring us that they "are unlikely to arise" [ESIA for coal transportation chapter 12, page 45]. Clearly unsatisfactory as these "results" are, the report concludes that "…other than monitoring, mitigation measures are not considered for the proposed dredging spoil disposal strategy" [ESIA for coal transportation., chapter 12, pages 14 &74.]

For its part, the SEIA, provided for the Asian Development Bank, also admits that: "[T]here is limited information [regarding] the biodiversity of the proposed disposal area". However, it recognises that the Swatch is one of three major fishing grounds in the Bay of Bengal that "support numerous pelagic and demersal fish and shrimp species" [para 41]. A programme is promised "… during dredging operations to specifically monitor fishing biodiversity at the spoil dump location" [SEIA, para 46]. It is not made clear how results of this monitoring will be interpreted; by what criteria they will be measured; and whether any cessation of dumping will result if a critical overloading point is reached. In fact, since disposal of the spoils depends on their gravity descent below 60m CD to the ocean floor [SEIA paras 152/153] – and this is below monitoring depth – the programme will prove useless in determining what the impacts on fisheries may be. (This problem is well-attested to by failures to determine the behaviour of waste rock and tailings disposal on the ocean floor through STD – submarine tailings disposal/deposition. [See: Roger Moody, "Into the Unknown Regions: The Hazards of STD", SSC and International Books, London and Utrecht, April 2000, *passim]*).

Akram Point, site of the deep water anchorage point for vessels receiving coal from Phulbari, is itself within the Sunderbans Reserve Forest, over which the Bangladesh Forest Department has jurisdiction [SEIA paras 37-38] but which is also internationally protected under the Ramsar Convention on wetlands. The assessment seeks to quell understandable fears of the consequences of a major coal spill, petroleum discharge, or accident/collision in this area by asserting that "the…anchorage will be at least 1.3km from the nearest shoreline which itself is 16kms north of the Sunderbans World Heritage Site." However, it admits that "the likelihood of an oil spill caused by a marine accident "is real", even if "remote." Similarly, the chances of a collision in this area are rated as "very low" and their force as being "low" - although the frequency will inevitably increase when the area is developed (an important point noted only in parenthesis). [SEIA paras 261-263]. There is a woeful under-estimate of the potential dangers posed by the amount and bulk of the coal which will regularly travel through this area. (It should be noted that the Ministry of Environment and Forests in neighbouring India currently legislates that no industrial plant of any kind should be situated within 25 kms of an "ecologically sensitive" area – citing the Gulf of Mannar in particular, which lies to the south and west of the Bay of Bengal). As the world's largest wetlands, the Sunderbans surely demands even greater protection than that provided elsewhere. Situating a major off-loading/transfer point – and one premised on operations over many years - so close to this unique and vital area, is manifestly unacceptable, if not downright reckless.

Part III: Conclusion

3.1 Securing the True Wealth of Bangladesh

The Phulbari Coal Project threatens numerous dangers and potential damages, ranging from the degradation of a major agricultural region in Bangladesh at a time of soaring food prices, to pollution of the world's largest wetlands and it's making a significant contribution to adverse global climate change. The project's Summary Environmental Impact Assessment, and its full Environmental and Social Impact Assessment are replete with vague assurances, issuing many promises of future mitigation measures that are inadequately defined or quantified, and *unlikely* (to use a favoured term from the ESIA itself) to be properly implemented.

Weak Governance: Despite many studies carried out in support of the assessments, the soundness of this complex venture hinges on three highly dubious assumptions. The first is that the Bangladesh government has the capacity to implement its own existing legislation; the second that it will introduce higher standards which will be enforced within a mere few years. Both these assumptions, if weighed against present evidence, seem highly difficult to achieve.

Weak and Inexperienced Proponent: The third assumption is that GCM/Asia Energy has (or will be able to acquire) sufficient practical experience of the kind required to hold up the safety nets when the project cracks at the seams with potentially drastic consequences for thousands of Bangladesh citizens and the country as a whole. The company clearly does not have such experience and almost certainly will be unable to gain it for many years. Indeed, the frightening prospect is that the Phulbari project, as a whole, will become a huge testing ground for a raft of reckless and ill-conceived experiments.

Quite rightly, among four key objectives which the ESIA pledges to uphold are the Precautionary Principle and that of Inter-generational Equity, whereby "the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations"[ESIA vol 1, chapter 3, page5]. In numerous instances, these pledges are bound to be compromised.

The ESIA seeks to present the Phulbari scheme as a kind of litmus test for Bangladesh civil society: endorsing it will put you on the side of the poor and materially deprived; faulting the project implies you are impeding "progress" or pursuing your own sectional interests: "Some environmental and socially concerned groups may prefer preservation over development (sic), whereas advocates of the Project would empathize (sic) with the resource and economic benefits." [ESIA vol 1, chapter 5, page 5].

This is a false and contrived juxtaposition which reflects adversely on the proponents of the project, rather than the many who have criticised it, both inside and outside Bangladesh. In September 2005, a report entitled "Where is the Wealth of Nations", challenged the use of conventional accounting figures – specifically GNP (gross national product) – in assessing human development standards. It pointed out that "natural capital" – such as forests, pastureland, wetlands, other protected areas, and the mineral deposits themselves - had to date been grossly undervalued. The report concluded that preservation of these resources are essential in the battle to reduce poverty.

Behind this report was neither an environmental campaign group, nor an academic claque, keen to expose the links between mineral over-extraction and the "resources curse." Instead, it was

the result of a careful in-house study by those working for the globe's most influential development agency - the World Bank.

3.2 Summary of key points:

i. The Phulbari Coal Project threatens numerous dangers and potential damages. These include the degradation of a major agricultural region in Bangladesh at a time of soaring food prices; pollution of the world's largest wetlands; and a significant contribution to adverse global climate change.

ii. The project's Environmental and Social Impact Assessment is full of vague assurances. It makes many promises of future mitigation measures that are inadequately defined and will almost certainly not be thoroughly implemented.

iii. The managing company, GCM Resources plc (Asia Energy), clearly has insufficient practical experience of a project of this magnitude.

iv. Both the "Precautionary Principle" and that of "Inter-generational Equity" will be severely compromised if the mine proceeds according to its present design

v. The mine will profoundly affect both the quantity and quality of water available in the area of the mine footprint

vi. The likelihood of uncontrolled acid rock drainage has - by the project proponents own admission - not been adequately assessed; nor has the risk of a serious seismic event in the mine area.

vii. The project will cause a significant increase in emissions of airborne particulate matter with a direct impact on peoples' health

viii. There is little evidence that project managers have the capacity to ensure that proposed rehabilitation measures will actually work

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The Bank Information Center partners with civil society in developing and transition countries to influence the World Bank and other international financial institutions to promote social and economic justice and ecological sustainability. More information is available at www.bicusa.org or write to Mishka Zaman, Asia Program Manager, BIC at mzaman@bicusa.org