



INTERNATIONAL SYMPOSIUM ON  
**DAMS IN A GLOBAL ENVIRONMENTAL CHALLENGES**  
Bali, Indonesia, June 1<sup>ST</sup> – 6<sup>TH</sup>, 2014



**Study of Social and Economic Impacts of Construction of  
SIAHBISHEH Dam Using Rapid Matrix Method**

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**ABSTRACT:**

*Considering to the growing needs of society for more water and energy resources, Nowadays construction of dams and hydroelectric power plants appear as an applicable solutions for the problem. Hence many countries have turned to the construction and use of these resources. Such that from 1950 the number of large dams with a height of over 15 meters in 5700 has reached more than 41,000. Dam construction along with the benefits and valuable impacts has disastrous effects on the environment and surrounding community and that's why having provided grounds for so many criticism. Industrial processes in the world to protect the environment and its associated parameters are in more attention and development by the day. In dam construction industry, this monumental task of screening is responsibility of professionals of this scope that are work In order to more correspond and coordinates between this industry and environmental factors. On the other hand, due to the growth and development of science in various fields, deployment of new and modern ways seems necessary and useful to achieve different and useful results. One of these methods is the analysis of the effects that reported by EIA. In order to fulfill these tasks and to reduce the social and economic consequences and improvements in the construction and operation of dams and case study of SIAHBISHEH pumped storage dams in Iran, extensive research has been conducted by the present authors. This paper with considering the current situation, proceed to assess the social and economic impacts of the project on the rapid matrix in EIA and have to offer the results were analyzed to improve the situation and solutions, strategies and experiences in this area.*

**Keywords: Dam, Environment, Rapid Matrix, EIA.**



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**ENVIRONMENTAL MANAGEMENT  
ON THE PRE-CONSTRUCTION STAGE OF UCPS HEPP DEVELOPMENT**

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**ABSTRACT:**

*Based on RUPTL 2012-2021, stated that PLN will prioritize the development of geothermal and hydropower. These two types of energy can go into the power system whenever they are ready, even though still must consider the power demand and the plan of another power plant development. In the RUPTL 2012-2021 also mentioned that if there is a potential, PLN prefer the power generation using hydro energy, such as pumped storage, peaking hydroelectric power plant with the reservoir. Hydro energy potential as a renewable energy in Indonesia is quite high. One of hydroelectric power plant that will be built by PLN is Upper Cisokan Pumped Storage hydroelectric power plant (UCPS HEPP) which has a power of 1040 MW (4 x 260 MW). UCPS HEPP will use two dams, Upper Dam and Lower Dam. The land area that must be acquired is covering 765 Ha, consisting of citizen lands and forest lands. UCPS HEPP development will use government loans from the World Bank (World Bank). The World Bank pays close attention for the impact that will arise from projects which use their loans. This paper will discuss generally about environmental management related to UCPS HEPP development plan on pre-construction stage, both from the Indonesian government and the World Bank, which is contained in the EIA, Land Acquisition and Resettlement Plan (LARAP) and Environmental Management Plan (EMP).*

**Keyword: HEPP, Upper Cisokan Pumped Storage, EIA, LARAP, EMP**



## THE SADDANG MULTIPURPOSE DAM FOR ANTICIPATE FLOODING AND ENVIRONMENTAL DEVELOPMENT

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### ABSTRACT

*A case of Saddang river is serious problem, not only in rainy season but also in dry season. Flooding of the river cannot be controlled by the Benteng barrage, nothing to be done by the farmers except waiting for flooding escape. In the dry season, it is not enough water to irrigate all fields because of water lost so that no increasing of rice cropping. Briefly, the flood and irrigation water crisis in connection with the global climate change, caused of: (1) Saddang dike over-topping so that about 3.951 ha of 93.724 Ha of irrigation structures in a bad condition (2) A lot of sedimentation deposited in the existing irrigation channel (3) No integrated and sustainable in operation dan maintenance of the channel (4) All irrigation channel are opened channel with the risk of water lost caused of illegal irrigation pumping, evaporation and infiltration. To solve the problem mentioned above: (1) In short term; Saddang dike and irrigation channel must be repaired urgently and Environmental improvement work must be done, a good conservation must be developed to stabilize the the river discharge, it will be useful to anticipate next flooding (2) in the middle term; a multipurpose dam must be constructed in the upper stream of the existing Benteng barrage to store and to control Saddang river (3) In the long term; the existing opened Irrigation channel must be changed with the closed irrigation channel by the concrete reinforce pipe to anticipate: illegal irrigation pumping, evaporation and infiltration. The result expected that with these methods: No flooding, no illegal irrigation pumping, no evaporation, no infiltration, securing water for food and rural community under climate change, increasing of food cropping, securing water to 7,574 km<sup>2</sup> of The River Basin for environmental development.*

**Keywords:** *Saddang multipurpose dam, environmental development, Anticipate flooding.*



## THE KARALLOE MULTIPURPOSE DAM FOR ENVIRONMENTAL AND RAW WATER DEVELOPMENT

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### ABSTRACT

*The serious problem of Jeneponto regency is a raw water crisis and the environmental decreasing during dry season. No secure water to the existing Kelara irrigation, rice cropping is not sufficient. Existing irrigation system uses the open channels with a lot of risk: evaporation, infiltration and illegal pumping. The Local Government Raw Water Treatment Plant (RWTP) cannot supply the clear water to the costumers as a target. In rainy season, the regulate flooding inundates public facilities in the rural and urban area for a long time. To solve the problem, it will be applied 3 terms; (1) in the short term, in the middle of 2014, the Karalloe multipurpose dam will be constructed a concrete faced rock fill type, continued with conservation development works to increase existing environmental and secure water to the reservoir. The reservoir will restore 30 million m3 water from Karalloe river. 50% of raw water will be supplied to 7.199 ha of existing Kelara irrigation area and 50 % will be supplied to RWTP for increasing the clear water for the urban (2) in the middle time, the construction will be continued by the improvement of existing irrigation. (3) In the long term, water resource structure will be constructed like the sediment control dams, sand pocket dams in the upstream of the dam to anticipate erosion and sedimentation to the dam, and construction of reinforced concrete pipe or the raw water transmission main to supply the reservoir water to RWTP. The construction will be continued by Jeneponto river improvement as a recharge of raw water. In the future, the expected result with the karalloe multipurpose dam will solve the raw water crisis for the existing environmental, clean water and irrigation development.*

**Keywords:** Karalloe multipurpose dam, Environmental, raw water, irrigation development, Global Climate change



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**A survey about passive defense, and lake dam's requirements to water fronts  
and how to construct a floating waterfronts in accordance with changes in  
Water levels in dams**

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**ABSTRACT**

*Design, accomplishment, and construction of floating water fronts in order to innovation, localization, technical knowledge transition, and alignments of those aims with current needs in dams, make movements and national efforts in comparison with Islamic Republic of Iran principles and macroeconomic policies, and at last, the unique feature of this kind of structures like flexibility, safety, strength, and longevity, reducing the costs and preventing exit exchange, fast constructions, ... are just parts of good results of powerful and active personnel of Sad Rah Abnie co. in this country. Profile design, construction and accomplishment, and benefits of using this kind of water front structures, that has been using for the first time in dam waters, are concluded in this article.*

**Keywords:** *water front, float, dam, passive defense*



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### **Blasting Vibration Control in Residential Area near Cheragh - Vays Dam**

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#### **ABSTRACT**

*Blasting operation for rock excavation is a most common activity in dam construction projects. The reduction of ground and air vibration to the defined level and control of fly-rock phenomena are important environmental aspects of rock blasting near residential area. Geological conditions, distance of existing structures from the blast point, structures resistance degree and charge weight per delay are the most important parameters that should be considered in blasting design to ground vibration control. The design of blasting parameters for rock quarry of Cheragh-Vays dam is studied in this paper from environmental point of view. Two villages with weak clay houses, dam structures and an earth materials slope with critical potential to sliding are the main structures that should be considered in defining of ground and air vibration levels.*

**Keywords:** *blasting, ground vibration, environmental aspects, dam.*



## **Multi-Criteria Studies for the Sustainable Management of Excavation Waste from three major Pumped Storage Power Plant Projects in Spain.**

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### **ABSTRACT:**

*In order to meet the challenge of integrating renewable energy into an efficient and flexible electricity market, Gas Natural Fenosa is developing three major Pumped Storage Power Plant (PSP's) Projects in Galicia (North-western Spain): PSP Belesar III with 212 MW, PSP Salas-Conchas with 371 MW and PSP Edrada with 763 MW. For the design of the three aforementioned projects, Gas Natural Fenosa has been reviewing the state of the art of technology and has included sustainability and security criteria.*

*The necessary construction work to build these new projects will involve the execution of approximately 22 km of tunnels as well as several shafts and caverns. These actions will generate a significant volume of excess excavation material of around 3,600,000 m<sup>3</sup> for which a final deposit will need to be found if its re-use as a raw material is not possible.*

*Both the high volume of material to be managed as well as the complex orography and social dispersion in the territory in addition to the significant natural, sociocultural and landscape wealth of the area around the three sites have made it necessary to conduct an extensive study of alternatives to define the most appropriate locations for the deposit of these materials and the final distribution as well as the rehabilitation projects associated with each one.*

*Thus, the result aims to not only take into account traditional technical and economic criteria such as the proximity to the extraction points, morphology and capacity of the final deposits, etc. but also other factors such as landscape integration, biodiversity projection and the minimisation of disturbances to the resident population and heritage-related elements.*

**Keywords:** *Hydroelectric, sustainability, excavation materials, mine waste management*



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## Strategies of public awareness on dams and reservoirs

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### ABSTRACT:

*Public awareness relating to dams and reservoirs has become one of the main concerns of professionals and therefore of ICOLD and National Committees.*

*The evolution of society in this subject has gone from a clear support to the construction of large dams to provide water needed for life and human and social development, to a contrary position. Especially in countries with a high level in the development of their water resources, this allows them to think that these needs are already resolved.*

*This approach has two serious drawbacks: 1) in many countries water is needed to have a reasonable standard of living and to alleviate the effects of arid climates and droughts, and 2) the expected effects of climate change make it clear that we need to adapt the strategy in water management to a new scenarios, even in developed countries, as seen in the flooding of large areas of Europe and America in the years 2012 and 2013.*

*Given these new situations ICOLD, through its Department of Communication and its Committee on Public Awareness and Education (COPAE), is developing a comprehensive information strategy to provide the public with objective data on the benefits of dams, reservoirs and regulating rivers.*

*This strategy is being implemented in some countries by their National Committees. A good example of these new activities is the SPANCOLD mirror Committee of COPAE, named CIPE, which has a composition in which, besides engineers (some with extensive experience in communication), there are journalists, environmentalists, historians, geographers and other professionals with experience in communication.*

*The strategy implemented by SPANCOLD and its special features are given in this paper.*

**Keywords:** *public awareness, benefits of dams, communication with media*





**Landslide Prevention  
On Reservoir of Upper Cisokan Pumped Storage Hydropower  
Based on Community Development**

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**ABSTRACT:**

*Indonesia, as one of the developing countries, in the process of growing, hence needs huge amount of electrical energy supply. Specifically for the Java-Bali region, the peak load in 2012 reached 21.237.000 MW, an increasing of 7.59%. In order to meet the electricity needs during peak hours, PT PLN (Persero) is building Upper Cisokan Pumped Storage Hydropower 4x260MW. This power plant is the first pump system in Indonesia. The working principle is storing energy in the form of water pumped from the lower reservoir into the upper reservoir during off-peak load and at high electrical demand (peak load), the water released from the upper reservoir into the lower reservoir to generate electricity. It will always change the reservoir water level fluctuations at 19,5 meters in 6,5 hours. Changes in water level fluctuations can rapidly influence reservoir slope stability, thereby potentially having catastrophic landslide.*

*Examination of the reservoir slopes through investigations Light Detection and Ranging(LIDAR) Map, Study of Watershed Management Plan, Previous Reports, and the physical properties of geological parameters. Based on these data, further modeling is conducted using the program Slope / W, it was found that there is potential land slide due to the low safety factor.*

*Through this research, it can be seen the influence of the pumped storage operating system on the reservoir slopes. Prevention of landslide is done by involving the community through disaster prevention, emergency response, rehabilitation, etc. Thus, the slopes of which may potentially collapse can be done early treatment, so the slopes are out of landslide danger and no fatalities when the upper cisokan pumped storage hydropower operating.*

**Keywords: Pumped Storage System, Water level fluctuations, Safety Factor, Slope Stability, Community Development**



**ENHANCING COMMUNITY PARTICIPATION IN DAM MANAGEMENT  
(PREPARING EMERGENCY ACTION PLAN) USING VISUAL  
COMMUNICATION MEDIA CONCEPT  
(Case Study : Krisak Dam, Wonogiri, Central Java, Indonesia)**

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**ABSTRACT**

*Dam performance degradation that also affects dam safety is related with a well-known problem, which is change of land use both upstream and downstream, and lack of care from the society to take care the area surrounding the dam. However, the local rules say that society have the same right to take place in dam building and maintenance. So, we need to have an activity that involves the society around it.*

*Much of the program that involves society around it has been done in DOISP (Dam Operational and Improvement Safety Program) that have purpose to maintain the dam itself and water catchment area and to educate the society itself so they could help in maintaining both of them. Beside that for preparing if the dam collapse, using information and knowledge of both profile and characteristics of a dam collapse scenario, to know the action for preparing before the disaster, what to do at the disaster itself, and disaster recovery efforts. Then we need to socialize to the society about this disaster scenario using integrated information, from government to people, both in content and method of distribution, so when the disaster itself happens, everyone already have that awareness and preparedness, reducing disaster casualties.*

*For that we need to have visual communication design team to help us make the information itself, to persuade people, give understanding, give the information, even make signs on the field so people could identify the problem fast and exact, especially when the disaster happens. This paper will explain one of the Emergency Action Plan which already been done to society around Krisak Dam, that based on Dam Break Analysis calculation they created a Emergency Action Plan guideline using visual communication media concept.*

**Keywords:** *Emergency Action Plan, Visual Communication Design, Dam Break Analysis*



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**MANAGEMENT AT DOWNSTREAM OF Ir. H. DJUANDA DAM  
WITH PUBLIC PARTICIPATION**

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**ABSTRACT:**

*Government Regulation No. 7/2010, about Jasa Tirta II Public Corporation (PJT II), establishes duties and responsibilities of water resource management which advancing and aligning social, environmental and economic functions in water resource management, organize qualified and sufficient public water utilization for fulfilling lives of many people, including provision of surface water for daily basic needs; irrigation water through existing systems; flood control; water resources conservation and development of drinking water provision system and sanitation for households.*

*The main problems in water resources management are the environmental issues that arise because of interaction between economic activities and limited environmental capacity, either because of natural influence or due to human activities itself, including reduced water quality, flooding, inefficiency of irrigation water, etc. Community involvement is required considering these problems arise as a result of society activities itself.*

*PJT II is trying to align social, environmental and economic functions in water resources management by growing public awareness and participation in management and utilization of available water resources in the form of Pilot Demonstration Activity (PDA). Community empowerment that have been done among others are: community based compost production, provision of clean water and sanitation, water management at paddy fields to improve water delivery efficiency, and river bank management with community participation approach.*

*The results from these activities are improving community empowerment to preserve water resources and assist the government in the implementation of water resource conservation, control the destructive force of water, and increase the economic value of water resources management.*

**Keywords: PDA, community empowerment**



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## **PUBLIC SAFETY AROUND THE DAMS IN SLOVENIA**

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### **ABSTRACT**

*Until recently, public safety has been a rather neglected topic in Slovenia. To ensure public safety, safety-aware companies have used the existing legislation governing the provision of safety in construction sites and on identified bathing waters. As in Slovenia, water and waterside land (watercourses, water bodies) is mostly characterised as public asset, there was, in general, a lack of legislative basis that would enable the managers to restrict movement and activities in the areas lying within close proximity to dams.*

*However, the accident at the Blanca HPP and the recent review of the state of water management works in Slovenia have shown the necessity of dedicating more attention to the problem of public safety and public awareness. As an upgrade of the analysis of the current state and instructions for improvement of public awareness and emergency procedures for the population, an on-line presentation of dams, their characteristics and problems associated with their existence, which also touched upon the problems originating from insufficient maintenance, problems and risks caused by improper operation, exploitation of the dams and the reservoir area was prepared for the Ministry of Defence.*

*The paper presents the current situation of public safety in Slovenia and searches for the opportunities to make a better use of the existing legislation and for rapid actions that could contribute to improve the situation in this area.*

**Keywords:** *Dam safety, upgrade of the monitoring system, operative monitoring, early warning system, public defense*



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**Integrated Water Resource Planning for South Africa: Water Use Efficiency**

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**ABSTRACT: INTEGRATED WATER RESOURCE PLANNING FOR SOUTH AFRICA: WATER USE EFFICIENCY**

*South Africa is a water scarce country with a very uneven distribution of rainfall and the resultant run-off in its rivers. This is further exacerbated by the fact that the large urban development's took place far from the largest available water resources. The rainfall is very erratic with long droughts followed by periods of above normal flows and floods. The only way to utilize the water was to develop dams to store the water for use over the long dry periods. Over the years many dams were built to supply water for irrigation projects, as well as to supply the metropolitan areas and industries. Complex interbasin transfers were required to link catchments where water was available with those where water was short. The Department of Water Affairs has in years identified the need to develop to ensure sufficient water for users. Reconciliation Strategies have been, or are in the process of being developed. The studies include scenarios of future water requirements, determine all possible options to manage water requirements and increase efficiency, determine options to supply more water from ground and surface resources, provide for the possible impacts of climate change and propose strategies to reconcile the growing requirements with the available resources. While the strategies differ in the detail from area to area, a number of common strategies emerged: (a water conservation and water demand management will have to be undertaken for all the areas to ensure more efficient use of water.*

**Keywords: Efficiency, Reconciliation, Strategy, Water and Availability.**



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## Study on environment friendly hydropower project construction

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### ABSTRACT

*With the rising level on social and economic development and people's consciousness on environment protection, environment impacts of dam construction are more and more concerned. For most of the developing counties, to protect environment and ecological system in the development of hydropower resources is the important issue in its sustainable development. How to harmonize the development of hydropower resources and the protection of environment, and to reach the win-win goal for economic benefits and environment protection is the key problem that should be considered in dam construction. By analyzing the impacts of hydropower project on environment and ecological system, the paper discussed the ecological and environmental concerns in the design and construction of hydropower project and proposed some mitigation measures. Besides, the criteria for building an ecological friendly project are also studied.*

**Keywords:** *hydropower, environment, design, construction.*



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**Silvan Project  
Implementation by Participation  
and Impacts on the Society, Economy and Environment**

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**ABSTRACT**

*Turkey, being one of the leading countries in terms of hydro potential development, has numerous completed and ongoing projects ranging from small hydro schemes to large hydro schemes. The Southeastern Anatolian Project (GAP) is one of the World's biggest social and economic development projects including 22 dams and 19 HEPPs which will create an irrigable land of 18'000 km<sup>2</sup> by utilizing the hydro potential of Euphrates and Tigris rivers.*

*With an approximate investment value of \$3.5 billion, Silvan Project, located in Diyarbakır, Turkey, is one of the largest components of GAP and is the last step to complete GAP. The project includes 8 dams, 1 hydropower station, 242'000 meters of irrigation channel, 2 tunnels with a total length of 15'360 meters and 21 pumping stations. After completion, the project will create 2'570 km<sup>2</sup> of irrigable land, employment opportunity to 320'000 people and will have a great impact on the social and the economic development of the region. The annual income is estimated to be \$63 million from energy production and \$460 million for the agricultural development. Taking into consideration the social impacts combining with the economic development, it is utmost importance that the Governmental Institutions and the Public cooperate at the utmost level to realize the project as soon as possible.*

*This paper focuses on the steps taken by the Government for the public and private sector participation in the project and the effects on society and the government in terms of social, economic and environmental factors.*

**Keywords: Development, Public & Private Sector Participation**



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**Implementation of the Hydropower Sustainability Assessment Protocol:  
Romanche-Gavet's project under construction in France**

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**ABSTRACT:**

*The Hydropower Sustainability Assessment Protocol (HSAP) is a framework to assess the performance of hydropower projects according to a defined set of sustainability topics, encompassing environmental, social, technical, and financial issues. Developed by the International Hydropower Association (IHA) in partnership with a range of government, civil society and private sector stakeholders, the Protocol is a product of intensive and transparent dialogue concerning the selection of sustainability topics and the definition of good and best practice in each of these topics. The main objective of an official assessment is to obtain impartial and verifiable findings on the performance of the project in relation to the sustainability issues set out in the tool.*

*The Electricité de France (EDF) Romanche-Gavet project is a 94 MW project in the implementation stage, located on the Romanche's river in south-eastern France. The project will replace six facilities on the Romanche River which were built in the early 20<sup>th</sup> century and have a total capacity of 82 MW, thereby increasing average annual generation by over 30%.*

*An official assessment by external accredited assessors was carried out over the period May to July 2013. This paper will present the sustainability profile of Romanche-Gavet's project under construction. It has relatively limited adverse environmental and social impacts, and has the potential to deliver long term benefits for the local community. The findings of this assessment reflect very high performance against the Protocol topics and criteria. EDF and its partners meet this high level of performance through a combination of corporate management systems, compliance with applicable legal requirements, and an open working relationship between the EDF people and the local community.*

***Keywords: Sustainability, assessment, social & environmental, dam construction, governance, stakeholder engagement and participation.***





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**Technical, Socio-Economic and Environmental aspects  
in converting Devsari H.E.P. (252MW)  
from Storage to Run of the River Scheme**

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**ABSTRACT:**

*India ranks third in the world after China, USA and Russia in terms of number of dams. India has so far constructed about 4818 large dams which have provided about 22000M of storage. Another 300 large dams with storages of about 3.9 000M are under construction. Large dams in India alone are estimated to have submerged 3000 sq km of land area. About 10 million of people has been displaced or affected.*

*While on one hand, storage schemes yield multipurpose benefits like irrigation, hydropower, flood and silt control, on the other hand various associated issues like environmental degradation, Resettlement and Rehabilitation and earthquake hazards also need proper attention and solution.*

*More than 40000 dams constructed around the world have helped many communities and countries economies in utilizing and harnessing water resources from half of the world's dammed rivers. Dams supported 30- 40% of the entire irrigated area of the world and thus supported 12-14% global food production. Around 12% of all dams supply water for drinking and sanitation. The dams of 100 countries have a flood control function to safeguard nearby communities. But, the above mentioned benefits from dams are just one side of the story. On the other side are the social and environmental impacts.*

*While Hydropower provides about 19% (2,000 TWh/yr) to more than half of 133 countries electricity supply, it can have adverse impacts on the environment and can be mitigated if well managed. Construction of Diversion dam as part of Run of the River development instead of Storage dam is one such solution.*

*Devsari Hydro Electric Project (DHEP) in Uttarakhand, India was originally conceived as storage scheme with 90 m high concrete gravity dam having installed capacity and design energy as 300 MW and 800M respectively. However, in view of huge submergence involved (22 ha) and other technical and environmental issues, it was modified into a Run of the River (RoR) scheme with much less submergence (82 ha) having 30m high concrete gravity dam with installed capacity of 202 MW. This paper discusses the various alternatives for arriving at the most optimum solution involving least submergence and maximum power benefits taking into considerations various technical, socio-economic and environmental issues involved.*

**Key words:** *Hydropower, Technical, Socioeconomic, Environmental, Dam*



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**La Romaine Hydroelectric Complex, Canada  
Management of the Riparian flow at Romaine 2  
during construction and reservoir filling**

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**ABSTRACT**

*Hydro-Québec is developing the Hydroelectric Complex of La Romaine, on the North shore of the St Lawrence River, in Quebec, Canada. The project consists of building 4 generating stations with a total installed capacity of 1550 MW and an energy output of 8 TWh. Environmental studies and measures carried out before, during and after construction until 2040 will cost over \$385 million altogether.*

*The construction of the Complex started with the Romaine-2 facility, which will be commissioned in 2014. Romaine-2 reservoir filling is planned to begin with the spring flood of 2014. Planning of the reservoir filling and design of the outlet works present many challenges due to the riparian flow requirements that have to be met and the important variation of the reservoir level during filling.*

*Hydro-Québec managed to find an environmentally acceptable, cost effective and reliable solution to meet this requirement: riparian flows required during Romaine-2 reservoir filling will be provided by three different structures that define the three phases of the reservoir filling: diversion, dedicated structure and spillway.*

*The Romaine-2 river diversion is more complex than many previous diversions conducted in the past 40 years, since it will be used to modulate discharge during the first phase of the reservoir filling. A dedicated structure was required to ensure a minimum flow for the whole water level range during the second phase of Romaine-2 reservoir filling. It will be, in fact, the first time that Hydro-Québec (HQ) will simultaneously water up a reservoir against an asphalt core dam, use the diversion gate to modulate discharge, use a temporary structure to fulfill the riparian flow requirements and proceed to reservoir filling in three phases.*

**Keywords:** *Romaine Hydroelectric complex, Reservoir filling, ecological flow, riparian flow, Diversion.*



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**European Working Group "Management of dam incidents"  
Case study: Finland**

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**ABSTRACT**

*European ICOLD Working Group "Management of Dam Incidents" was established in Venice Italy in April 2013 to study European dam safety practices and experiences. The study will comprise at least following items: the dam safety legislation, the guidelines and the documentation related to the dam incidents, the training activities of dam incidents, the roles of the authorities and the dam owner, the safety arrangements practices and the analysis of the dam incidents and failures. The management of the dam safety at the tailings dams is included in the scope. The objectives of the Working Group are to improve the practices handling dam incidents and to collect the best practices of the member countries. In this paper the work on Finnish ICOLD committee are presented by introducing some characteristics of Finnish dam safety legislation and experiences.*

***Keywords: dam safety, management, legislation, dam incidents.***



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**GREENHOUSE METHANE GAS EMISSION FROM RESERVOIRS IN  
JAVA, INDONESIA.**

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**ABSTRACT**

*Global warming may cause climate change followed by a negative impact, namely: increased rainfall, increased frequency of disease, rising sea levels, declining biodiversity. Global warming is mainly caused by increasing levels of greenhouse gases (GHG), namely CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFCs, SF<sub>6</sub>, PFCs in the atmosphere. Reservoir waters are considered by some researchers as a very potential source of methane (CH<sub>4</sub>). In connection with this, research was done on the emission of methane gas in the reservoirs in Java. The study of methane emissions in these reservoirs was done by direct field measurement by means of Fluxmeter. The results showed that the amount of methane gas emissions from 14 reservoirs in Java ranged from 0.094 to 4.461 g/m<sup>2</sup>/day with an average of 1,705 g/m<sup>2</sup>/day. Reservoir water quality, especially organic content, depth and season have a great affect on methane emissions. Reservoirs in Indonesia cover approximate an area of 98 269 ha, thus, the amount of methane gas emissions is estimated to be around 1,675 tonnes/day. Based on these result, is indicated that the contribution of methane gas from reservoirs in Indonesia is very little when compared to the source of the swamps, rice paddies, livestock and garbage. Methane emissions from wetlands, rice paddies, livestock and garbage in Indonesia is respectively 529,590 tons/day, 17,986 tons/day, 1,477 tons/day and 6,673 tonnes/day.*

**Key words:** *reservoirs, global warming, potential, emission, methane gas*



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**ENVIRONMENTAL MANAGEMENT DURING CONSTRUCTION  
IN COMPLIANCE WITH MEXICAN REGULATIONS**

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**ABSTRACT:**

The construction of dams in Mexico has increased significantly in the last few years, due to the need for water storage and energy generation. However, the construction process can have a significant impact on the environment, particularly in terms of land use, waste management, and emissions. This paper presents a case study of the environmental management during the construction of a dam in Mexico, focusing on compliance with Mexican regulations. The study identifies the main environmental impacts and proposes measures to mitigate them. The results show that the implementation of an environmental management plan is essential to ensure that the construction process is carried out in a sustainable and responsible manner.

**Keywords:** environment, land, wastes, discharges, emissions, certification



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## **Evaluation on the Effect of Dam Engineering to Atmospheric Ecosystem**

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### **ABSTRACT:**

*Since 1961, with the increasing global population and consumption of fossil fuel as coal and petroleum, global temperature has been rising continually at an average speed of 0.2°C per decade. As an engineering measure to harness hydropower, dams are playing more and more important role in slowing down the global warming process. In this paper, by comparing the Dagangshan hydropower station in China with a thermal power station of the same installed capacity, both positive and negative effect of dams to the atmosphere ecosystem are analyzed thoroughly. For the positive effects, (1) hydropower station can reduce the release of CO<sub>2</sub> by 648g/kWh compared with thermal power station; (2) Reservoirs formed by dams can improve the meteorological conditions in the reservoir area, enhancing the capacity of plants above the water level to absorb CO<sub>2</sub>. For the negative effects, (1) the scale of dams is usually large and its construction will consume large amount of electricity, petroleum and construction material, indirectly emitting some CO<sub>2</sub>; (2) the reservoir created by dam will inundate plants whose rotting will also release some CO<sub>2</sub>. Comparing the above indices of CO<sub>2</sub> release, the positive effects of power-generating dam engineering is far more superior to their negative effects to the atmospheric ecosystem.*

**Keywords:** *dam, CO<sub>2</sub> release, reservoir, atmospheric temperature*



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**Roadmap of pre-investment process for a hydropower project.  
Case study Tarnita-Lapustesti pump-storage hydropower plant.**

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**ABSTRACT**

*Building a high power hydro plant with accumulation through pumping is an old interest of the specialists within the romanian national energy system.*

*The location of the project is Somesul Cald River, Cluj County. Hydropower parameters are: maximum installed capacity 1000 MW; hydro-mechanic equipment motor-generator reversible units (no. of units: 4 pieces x 250 MW); pumping cycle: weekly; quantity of energy generated in generator mode: 1,625 GWh/year; quantity of energy generated in pumping mode: 2,132 GWh/year; transformation coefficient: 0.76. Investment cost on 1.01.2009 is 1,029 million euro (VAT exclusive).*

*This material aims to present the roadmap of national interest project Tarnita-Lapustesti PSHPP (pump-storage hydropower plant), pre-investment process :*

- strategic environmental assessment (SEA) procedure;*
- environmental impact assessment (EIA) procedure;*
- public consultations held ,public acceptance of the project;*
- land acquisition and resettlement;*
- historical monuments assessment procedure .*

**Keywords: pump-storage hydropower plant**



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**Public participation, Human Security and  
Public Safety around Dams in Sweden  
A case study of the regulated Öme and Lule Rivers**

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**ABSTRACT**

*This paper presents findings of an empirical study of the current situation with geographical focus on two rivers in the north of Sweden, the indigenous territory Sápmi. The major focus in Sweden within “dam safety” is on the prevention of dam failure, and emergency preparedness. The issue of “public safety around dams” is left aside to the detriment of “human security”. While a major dam failure may cause the death of hundreds up to thousands of people, the current rate of human deaths caused by dam failure the last 40 years is one person. The number of fatalities that may be referred to as “public safety around dams” on the Lule River only amounts to 1-2 persons per year. The risks and dangers involved also cause stress, anxiety, and difficulties on an everyday basis for residents along the regulated rivers and water courses. From a study of literature, available statistics, interviews and newspaper reports we discuss the accidents and incidents over the last decade (2002-12), how these may be defined as “public safety around dams”, the void of work to prevent such accidents and how the surrounding societal contexts play in, such as the lack of availability to fast and efficient emergency rescue services to be able to save lives.*

*Finally, we also discuss the current void of public participation and make recommendations to enhance public participation and thereby possibilities to an enhanced public safety around dams in Sweden. The research is funded by Swedish research councils VR and FORMAS.*

**Keywords: Public Safety, Sweden, Sápmi, Human Security**





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## Development of Cruising RCD Construction Method

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### ABSTRACT:

*The RCD construction method is a rationalized construction method for concrete dams which was originally developed in Japan in 1970's. The RCD construction method has been applied to about 100 concrete gravity dams in Japan, and has achieved reduction of the construction period, the labor cost, the environmental issue, and the hazard in safety for the constructor. However, under the current social and economic conditions, it is necessary to develop technologies to achieve further rationalization in order to cut costs.*

*The conventional RCD construction method has two major problems to be solved for the further rationalization, such as alternate placement of RCD and external concretes and setting of cross-forms along transverse joints at the stopping of RCD concrete placement in a lift. The "cruising RCD construction method" has been newly developed to solve these problems.*

*In this paper, we will introduce an outline of this technology including application cases based on "Engineering Manual for Cruising RCD Construction Method Technology" published by the Japan Dam Engineering Center.*

**Keywords:** *crusing RCD construction method, concrete dams, rationalization*

But the conventional RCD method still has two major problems to be resolved for the further rationalization. One is an alternate placement of RCD concrete and external



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**Environmentally friendly water-powered DTH drilling in dam applications  
- The history of Down-The-Hole-Drilling and  
use of water-powered hammers**

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**ABSTRACT**

*Down-the-hole drilling has been a feature of dam anchoring and rock mass grouting in the U.S. for many decades. Until quite recently, this rotary percussive drilling method was synonymous with the use of compressed air. Within the last decade, however, increasing use has been made of water-activated, down-the-hole hammers. These provide many significant advantages, especially for rock fissure grouting where the use of water flush is now regarded as standard, and the use of compressed air is not advisable. This paper provides a brief history of the development of down-the-hole hammers in U.S. practice, and describes the numerous steps which have been followed to make contemporary hammers especially efficient and cost effective. The paper also describes the operating principles of water-powered hammers, and reviews the numerous, significant advantages these tools have brought to the dam remediation community.*

**Keywords:** *water power drilling environment safety*



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## **The Evolving History of Lake Biwa Weir**

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### **ABSTRACT**

*The management history of Japan's Lake Biwa - Yodo River basin may be characterized by the conflicting interests between upstream Shiga Prefecture and downstream Kyoto-Osaka-Hyogo Prefectures, with the central government playing a role to mediate as well as to dictate the situation. Over the course of basin history, it was the Lake Biwa communities that had to suffer from the occasional severe flooding, allowing those downstream to be spared of the flooding risk. The catastrophic and historic flooding in 1896 led to the construction of a flood control weir in 1905, bringing about a significant reduction in risk. The weir was replaced with a new structure in 1961. Development of lake water resource has also been a central issue of Biwa-Yodo basin management, as exemplified by the inauguration in 1972 of the Lake Biwa Comprehensive Development Project (LBCDP). Completed in 1997, the Project included water resources development, enhanced flood control measures and economic development and environmental conservation for Shiga Prefecture. Together with the construction of an around-the-lake levy system, Lake Biwa was effectively turned into a huge reservoir. Over the past decades following the completion of LBCDP, there has been emergence of an array of new issues, with gradually changing upstream-downstream relationship. This article is meant to introduce the Lake Biwa Weir implication depicted in Chapter 6, "Evolving History of Lake Biwa and Yodo River Basin Management", in the book entitled "Lake Biwa: Interactions between Nature and People, cited in REFERENCE.*

**Keywords:** *Lake Biwa, Water Resources, Flood Control, Upstream-Downstream Conflict, Ecosystem Concerns*



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**Study of Social and Economic Impacts of Construction of  
SIAHBISHEH Dam Using Rapid Matrix Method**

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**ABSTRACT:**

Considering to the growing needs of society for more water and energy resources, Nowadays construction of dams and hydroelectric power plants appear as an applicable solutions for the problem. Hence many countries have turned to the construction and use of these resources. Such that from 1990 the number of large dams with a height of over 100 meters in 2007 has reached more than 10,000. Dam construction along with the benefits and valuable impacts has disastrous effects on the environment and surrounding community and that's why having provided grounds for so many criticism. Industrial processes in the world to protect the environment and its associated parameters are in more attention and development by the day. In dam construction industry, this monumental task of screening is responsibility of professionals of this scope that are work in order to more correspond and coordinates between this industry and environmental factors. On the other hand, due to the growth and development of science in various fields, deployment of new and modern ways seems necessary and useful to achieve different and useful results. One of these methods is the analysis of the effects that reported by EIA. In order to fulfill these tasks and to reduce the social and economic consequences and improvements in the construction and operation of dams and case study of Siahbishi pumped storage dams in Iran, extensive research has been conducted by the present authors. This paper with considering the current situation, proceed to assess the social and economic impacts of the project on the rapid matrix in EIA and have to offer the results were analyzed to improve the situation and solutions, strategies and experiences in this area.

**Keywords: Dam, Environment, Rapid Matrix, EIA.**