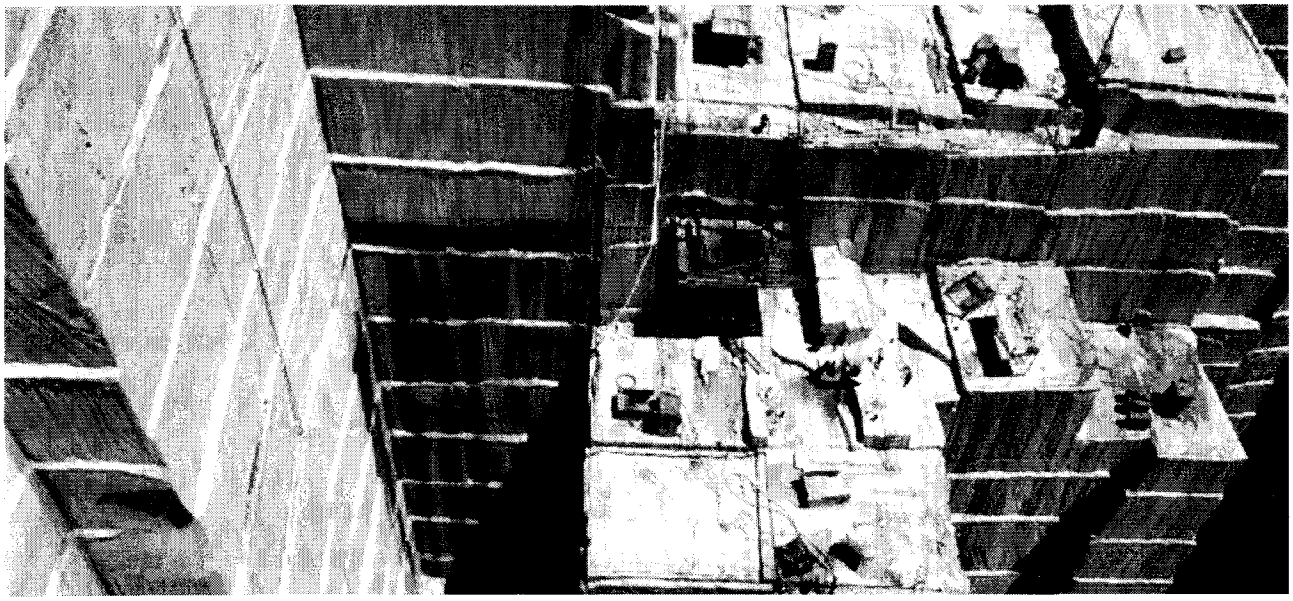
THEMES IN DESIGN AND ECOLOGY



Ill. 1. Granite quarry in Maine.

Cutting Losses, Gaining Ground

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This two-part research project begins with an existing conflict between local development interests and national preservation interests in Norway. A mountain consisting of gneiss is the site of this conflict, and the players are many. A local developer who wants to exploit the mountain of its valuable mass by creating the largest quarry in Europe is hindered by the Norwegian Department of Environmental Affairs, which suggests that this area should be included in a nearby national park. This stirs the attention of three other players. The local community, led by their mayor, supports the developer's proposal, seeing the quarry as a way out of the village's financial problems. An unlikely coalition of tourist industry representatives and university-based researchers, meanwhile, voice its opinion against the quarry. The nature-based local tourist industry finds that an immense cut in the precious landscape is bad for business, whereas the geologists argue for the preservation of the mountain for its geological significance. This conflict, then, highlights the juxtaposition between local interests who want immediate revenue from the mountain, and national interests, which determine that the mountain shall not be touched. Can the romantic conservationist coexist with the utilitarian developer? Can one combine the space of the tourist with the researcher's domain?

By investigating this real conflict between local population and national authority, between utilitarian and romantic views of nature, and by demonstrating that how we look at nature is indeed evanescent, I propose a third way out that combines these perceptions of nature.[1] The proposal allows multiple natures to coexist and sometimes coalesce in a space that is simultaneously preserved and developed. It demonstrates through models and drawing, how quarrying, tourism, research and local industry can coexist in a symbiotic relationship throughout a thirty-year development perspective. Moreover, this third way of perceiving nature would benefit all players in the conflict by cutting their losses while simultaneously gaining new ground.

PART ONE: MOUNTAIN SURVEY

Mapping current and past situations of this particular mountain, these

plate 1: cutting losses, gaining ground - Two mountains in one: the tourist and preservationist appreciate the mountain's beauty, the local and the developer both see the utilitarian use of the granite and the benefits for the local community. Is it at all possible to create a framework that allows all these players to coexist?

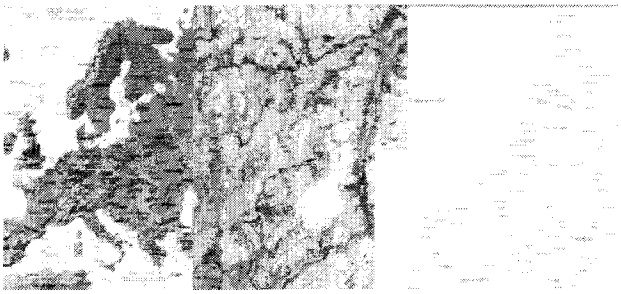


plate 2: mountain situated in Norway's fjords - Zooming into the mountain formed by glaciers. The long, jagged west coast edges into the Atlantic ocean. The site for the quarry is situated 60 degrees north, approximately two hours drive, either by car or by boat from Bergen.

eleven plates form an incomplete but widespread survey of the mountain. The survey outlines the current socio-economic situation and the political conflict of the quarry, and summarizes its historical significance in painting, philosophy and tourism. Seen as a threshold into a complex and multifaceted discussion, this survey illustrates the many factors that constitute nature management.

The site of the project is in Norway, a Scandinavian country stretching from about 60-80 degrees North. The project is situated on the country's southwest coast, a region characterized by its glaciated landscape. This is a dramatic fjord landscape where steep mountains dive into the sea, and the population [about 4 million people] clings to a narrow strip of green separating the mountains from the fjords. The glaciated landscape does not easily accommodate land modes of transportation, since one has to travel over mountains and traverse fjords. But unlike many other areas in Norway, and because of these land formations, the area where the project is situated has a distinctive, warm and dry microclimate that gives the area the nickname "fruit gardens of Norway"[2].

The population makes its living by predominately fishing and

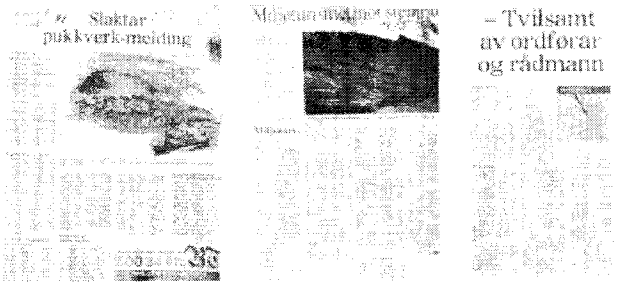


plate 3: political conflict - "Slaughtering quarry- publication" "Eco-tourism against quarry" "Doubtful of Mayor and City Manager". Headlines from the heated debate in local newspapers.

farming, as well as tourism and industry related to hydro-electrical power. The area has had severe difficulty in adjusting to a new economy, and has not been able to accommodate the needs and aspirations of many in the younger population, who earn college degrees and find work distant cities. This problematic transition from nature-dependent industries to a new economy is manifested in the area's conflicting views of nature, and it has created conflicting interests demonstrated in this project.[3] This conflict of nature exists beyond the level of romantic versus utilitarian nature philosophy; it exists also as a conflict between the local democracy and the national democracy.

A developer found that this mountain's granite had great properties for developing gravel. In addition to being very hard, it is also lightweight. It is therefore easy to ship to destinations in central Europe. Seeing this opportunity, the developer proposed to develop Northern Europe's largest quarry on this site. The mayor, seeing this as a way out of the financial problems of the village, which had already lost its post office and is in danger of losing its primary school, supported the developer's proposal. He also saw the potential of bringing new jobs to a community threatened by depopulation. The mayor lobbied for political support on the county level – and got it. But when the national government's Department of Environmental Affairs came to the site on a fieldtrip to gauge the situation, they rejected the proposal to develop a quarry at the site. Instead, they suggested that this particular mountain should be a part of a proposed nearby national glacier park.

This conflict, then, highlights the juxtaposition between the local interests who want the immediate revenue of the mountain, and the national interest, which, determines out of a romantic view of nature that the mountain shall not be touched.

The farmers generally consider the mountain valueless. After all, the sheep could find nothing to eat on the mountain because of the granite's acidic character. Then the developer came and found

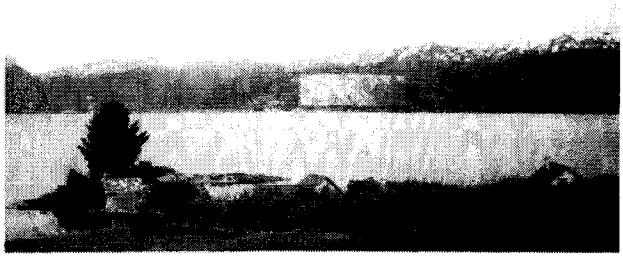
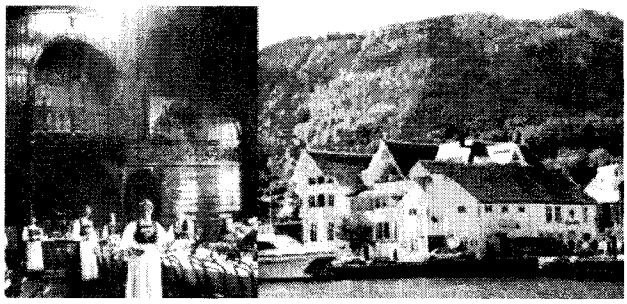


plate 4: mountain value - View from the opposite side of the fjord. The highlighted area indicates the proposed quarry site.

plate 5: resorting to the mountain - Simultaneously a site for expeditions and for inspiration: both the early eco-tourists of the 19th century and philosophers would resort to this area that might now be exploited.



Ill.6 - plate 6: tourism - Today, tourism architecture has lost some of the scale and grandeur of 19th century travelers. The dining hall at Odda Hotel was staffed with women wearing regional costumes. This hotel was torn down in the 1970s, whereas Sandven Hotel in Norheimsund is still open. While the hotel has not changed a great deal, the mode of transportation is quite different. Speedboats connect the villages in the inner fjords with Bergen, situated westward by the ocean.

Ill. 7 - plate 7: vernacular - The buildings shown here are noteworthy for the vernacular use of the area's stone: The buildings on the middle photo belongs to the same farm: one being the summer mountain residence, the other with the slate roofs from the local quarry is located by the fjord for year-round habitation.

that the granite of the mountain is indeed very valuable, and can be exploited easily. The geologist also found interest in the mountain, appreciating it for its didactic properties – due to its exposed glaciated surface; it is easy to read how the glacier transformed the mountain some ten thousand years ago. The tourist also found the startling beauty of the site as an asset, easily accessible by foot. Would it be possible to accommodate these four contradictory assessments of the mountain, and offer a mountain valuable for the farmer, the developer, and the researcher as well as the tourist?

Ludwig Wittgenstein resided in Norway altogether six times, and found natural surroundings inspiring for his work: "I cannot imagine that I could have worked better anywhere in the way I work here. It is the quietness and the wonderful landscape, I mean the silent gravity of the landscape."[4]

Another philosopher also enjoyed this landscape, Arne Næss, who coined the term "deep ecology", rests safely in his ropes on the way to a western Norwegian summit.[5]

When they make use of nature as a haven of inspiration and as a realm for creativity, the two philosophers mentioned here cross the role of the tourist and the role of the researcher, demonstrating that there is a valid place for various and often disparate activities at the mountain.

Mountaineers arrived from central Europe in the 1850s. With them a new building type was introduced, and "dragon-style" light-frame wood construction became widespread. Hotels in this style were constructed throughout the fjord-landscape, contrasting with the existing vernacular in form, size, materials and structure.

Extensive use of local stone is apparent in the traditional architecture. In many instances, the use of ground formations becomes a prevalent part of the built environment. For example, the two buildings depicted here are situated under an overhang so that it functions as a first layer of weatherproofing – the roofing material is then not slate, but rather wood. There are long traditions in the area for quarrying slate for building purposes; the closest quarry is still working, having been in continuous use since the 1600s.

In the specific area under investigation, called Hereiane, the Department of Environmental Affairs stands by its Romantic view of

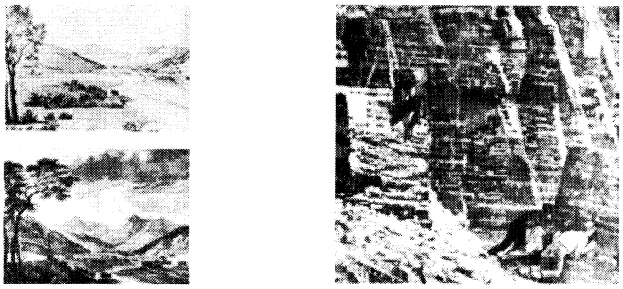


plate 8: ephemeral nature - In this contemporary painting, Mark Tansey in his "Constructing Grand Canyon" demonstrates how the surveyor, the politician and the laboring tourists construct this nature – and the canyon itself is made up of words.

plate 9: transient nature - This canonized national romantic painting by duo Tiedemand and Gude from the 1850s depicts a wedding party traveling in a church-boat on the Hardangerfjorden. Contrasting this romantic vision, the paraphrasing 1970s painting shows the same site but a radically different view of nature.

nature, whereas the locals have adopted a more utilitarian view of the same place. For views of nature to change as much as in the case of Hereiane is not a new phenomenon. Simon Schama makes this argument evident in his book "Landscape and Memory," in which he shows how these two illustrations from Paul Sandby's surveys of Scotland closely relate to the political situation at the time. Sandby, depicting Scottish nature immediately after Scotland was conquered by England, drew the hilly Scottish landscape in close resemblance to the rolling hills of England. However, when revisiting his drawing about forty years after, when the political tension between England and Scotland had cooled down, he returned to the distinct identity of the Scottish landscape. Hence, Sandby "Scottifies" the landscape by re-drawing the hills as dramatically steep, and changing the foreground tree to a more robust "wild" one. In an especially definitive gesture, a Scotsman in Tartan and a herd of sheep are placed as foreground. It is only when Scotland is safely integrated within England that it is given its own identity.

In a similar fashion, the view of nature in the area of Hereiane has changed over time and in light of changing political situations.

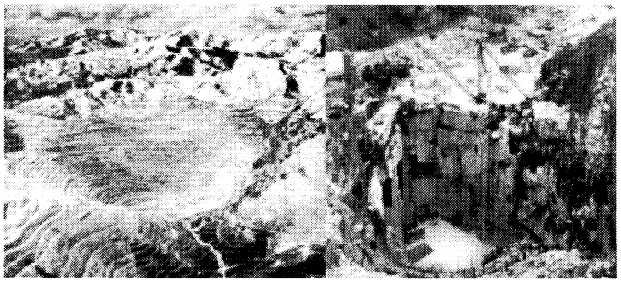


plate 10: two excavation methods - Excavating entirely different minerals; one a surface-operated copper mine in Utah and the second a marble mine in Carrera, Italy, demonstrates the different impact that quarrying might have on the landscape.

The allegorical painting " Brudeferden i Hardanger" (Weddingparty in Hardanger) depicts the not-yet-independent nation identifying itself by its spectacular nature. It is starkly juxtaposed in the other painting, a 1970s oil crisis commentary. In this painting the social-democracy-turned-oil-nation is depicted as a fishing boat sinking into the very same, but now oil-polluted, Hardangerfjord. The exploitation of Norway's abundance of natural resources is the theme of this painting. It demonstrates how the environmentalists, who rage against the utilitarian state-driven oil production, now adopt the romantic perception of nature, previously belonging to the proud founding fathers of Norway. These two paintings demonstrate how the romantic view of nature, illustrated with motifs of the Hardangerfjord area, fluctuated between different political forces throughout the last century. From being the prevalent nature view of the new nation in the 1850s, the romantic view was adopted by the anti-mainstream environmentalist culture of the 1970s, and is the currently the gist of the government's Department of Environmental Affairs position.

Deep Hole Quarrying

The two methods of excavation affect nature very differently. Deep-hole quarrying is most common in North America. The mode of operation is based on stationary equipment, so that the quarry would develop in the reach of the cranes that upload the stone. The deepest quarry in North America is over 60 meters or about 200 feet deep.[6] A typical crane has a loading capacity of around 100 000 pounds, or 50 metric tons, which is the weight of about 17 cubic meters granite.

Loader Operation or Finnish Method

In contrast to the deep hole quarry, the Finnish excavation method is more horizontal than vertical. The quarry covers a wider area and is operated by relatively small, mobile equipment. This method is cost efficient, but has a larger visual impact on the landscape. By exploring the quarry horizontally, the hauling process is conducted by ve-

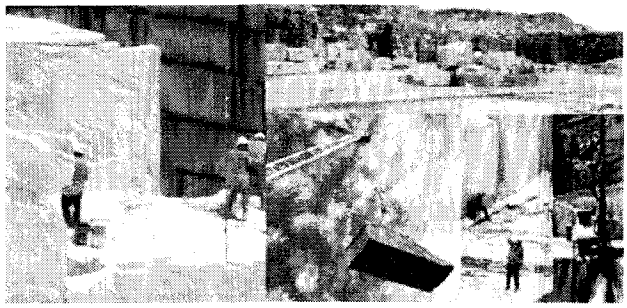
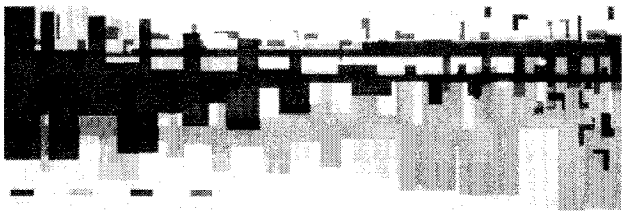


plate 11: combination quarry - A granite quarry in Vermont illustrates the use of both stationary and mobile equipment in a deep hole system. The scale of this quarry is quite impressive: the depth reaches over two hundred feet.



Ill. 12: A time line through thirty years, demonstrating how tourism, research, local industry and quarrying might coexist. The intension here is not only to predict how the quarry is going to appear when it is exhausted in terms of subtracting stone from it, but also to highlight possible overlaps that will occur when these functions grow together.

hicles and not cranes. Thus, the quarry itself is car-accessible.

Although these two methods of quarrying require different equipment and are opposites in the way they change the landscape, they are also possible to combine. For example, it is common to use the Finnish method in order to clear a site for a deep hole quarry and it is also quite common to use the mobile equipment in combination with stationary cranes, especially in the bottom of a deep hole quarry.

Quarry Processes

Both quarrying processes also include exploring, dewatering and flood control, hauling and transportation matters and structural issues of the cutting process. The cutting process has traditionally been conducted by drilling and by the use of explosives, but new technology now provides machinery that cuts granite by using heat. Due to its noise-reducing properties, this new technology opens up the possibility to combine a quarry with other uses. Also, the traditional forms – both surface and deep-hole — of the quarry might be revisited, as combining new technology allows for a third way of quarrying.

PART TWO:

Cutting Losses: A Model of Coexistence through 30 Years

This second section deals with the two questions that have been central to my research:

1 Could the romantic conservationist coexist with the utilitarian developer?

2 Is it at all possible to combine the space of the tourist with the researcher's domain?

Taking my departure from new discoveries in quarrying technologies mentioned above, the third way of quarrying that I propose here would be affected by several factors. For example, it might seem impossible to predict the very process of quarrying. Even with significant testing of the geology from the surface, some decisions must be made throughout the process because it is impacted by the condition of the geology itself. Furthermore, rather than proposing a specific development plan, the diagram explains this approach as a loose framework that allows for the coexistence of several perceptions of nature. By doing that, it clarifies how the quarry might be developed as an active place throughout the process of exploiting stone, while securing the after-use of the quarry as an eco-tourist destination.

To further document the model of coexistence, the following three models illustrate in ten-year increments how these programmatic overlaps might occur.

00 – 10 Years: Cutting Losses

In the first years the eco-tourist destination and the quarry grow in an interdependent relationship. Areas that are to be built and used by the eco-tourist destination or by researchers and the local population would be fully exploited first. Areas that are to be changed according to the quarry process, such as a climbing wall and research center, will be exploited concurrently with their respective functions. With the exception of these two sites, which will be started with deep hole quarries, the process of quarrying in this first phase will be surface quarrying.

Quarry: Sequence of exploitation: Three disparate areas

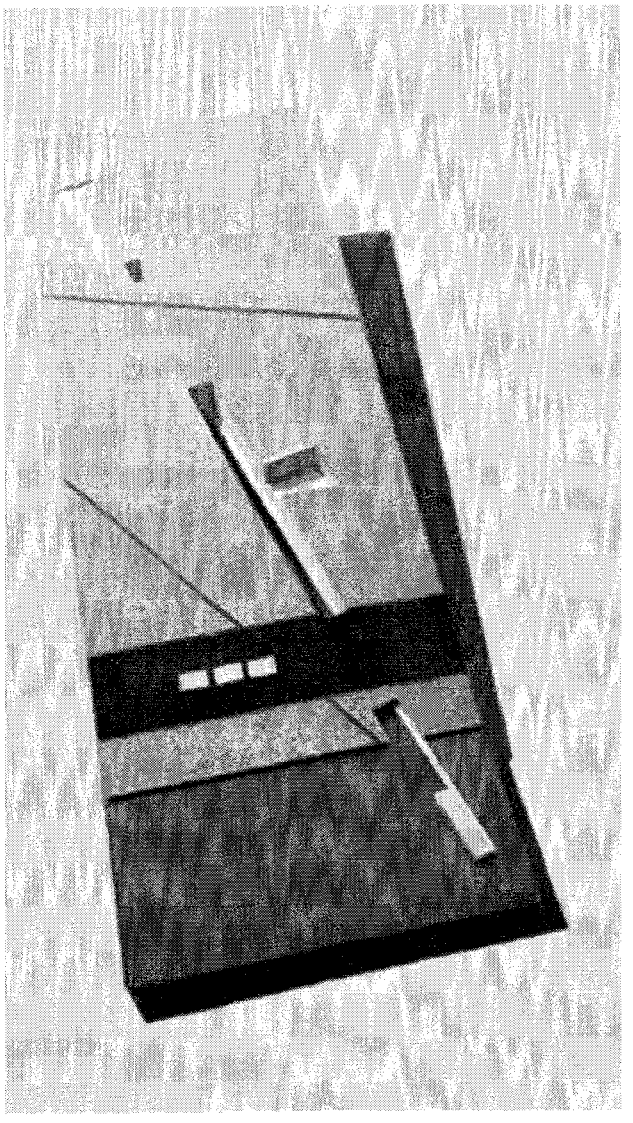
- area nearest shoreline, access tunnel under greenbelt for haulers and loaders and tourists
- sea water fills in first part of pit
- base camp explored for granite

Infrastructure: Serving both quarry industry and tourism, research station and local industry.

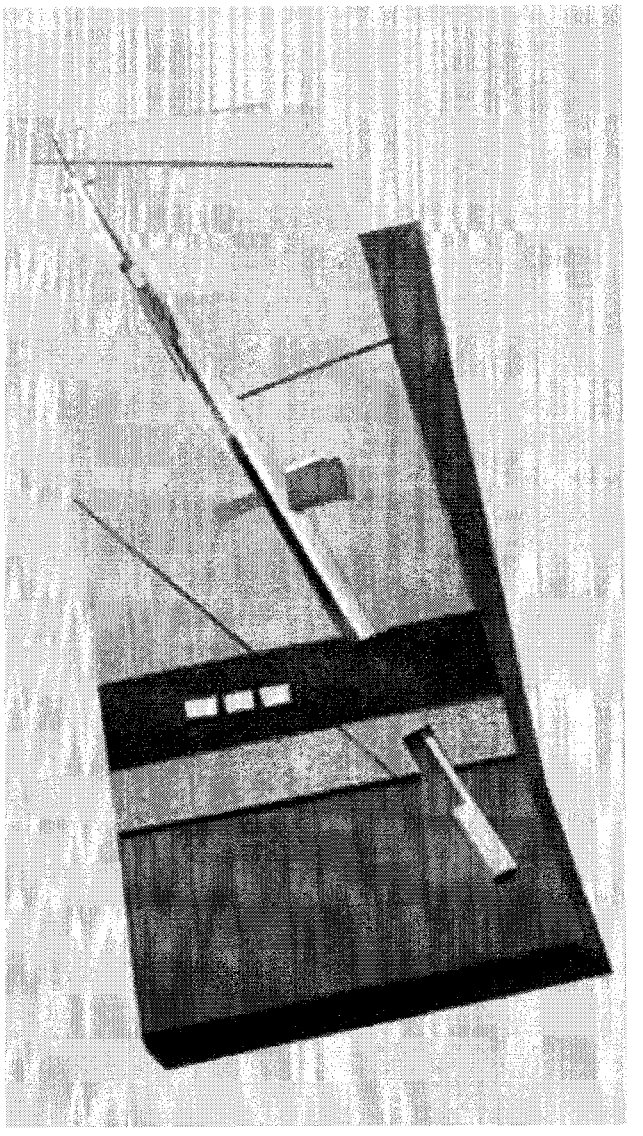
- harbor for both transporting gravel as well as tourists
- access road system for both tourists and loaders
- road through quarry from landing to base camp

Climbing Wall

- deep hole quarry – exploited with simultan access for climbers
- short wall sports climbing
- movable roofing system for severe [normal, that is] weather.



Ill.13 - Phase 1: Model illustrating the first 10 years of development



Ill. 14-Phase 2: Model illustrating the intermediate 10 years of development

Base camp

- exploited ground
- inserted RV parking, cottages, camping facility

Research center

- upper level of deep hole quarry carved out
- first part of center built

Visitor center – outside quarry – build first and independently

- trailhead guides
- rooms for researchers
- cafe

11– 20 years

In the second phase, major amounts of granite are still being extracted from the main pit. Local program integrates with quarrying and tourism. A fish farm pond takes up the upper level of the pit.

Quarry: third way of quarrying

- a shift from deep-hole quarrying to a combination-method with surface mining of the quarry proper

Infrastructure

- As part of the mining system, the serpentine ascent to the top begins to take shape
- shore loop
- establish path system and follies

Research center

- carved out for second level expansion

Climbing wall

- expands to deeper part of the deep hole pit

Gardens

- green houses, fruit farms and fish tanks

21 – 30 Gaining Ground

Surface quarrying diminishes, and tourists, locals and researchers prepare to take over the structure. The research facility adds on yet another section under the previous one. Now an adult, the quarry gradually phases out though production of architectural stone beyond thirty years described here. In this way, tourists, locals and researchers take over the area.

Quarry

- final stage: deep hole quarry in the quarry proper

Infrastructure

- serpentine ascent to the top finished

Research center

- final stage – quarrying ends with the final stage of the research building

Climbing wall

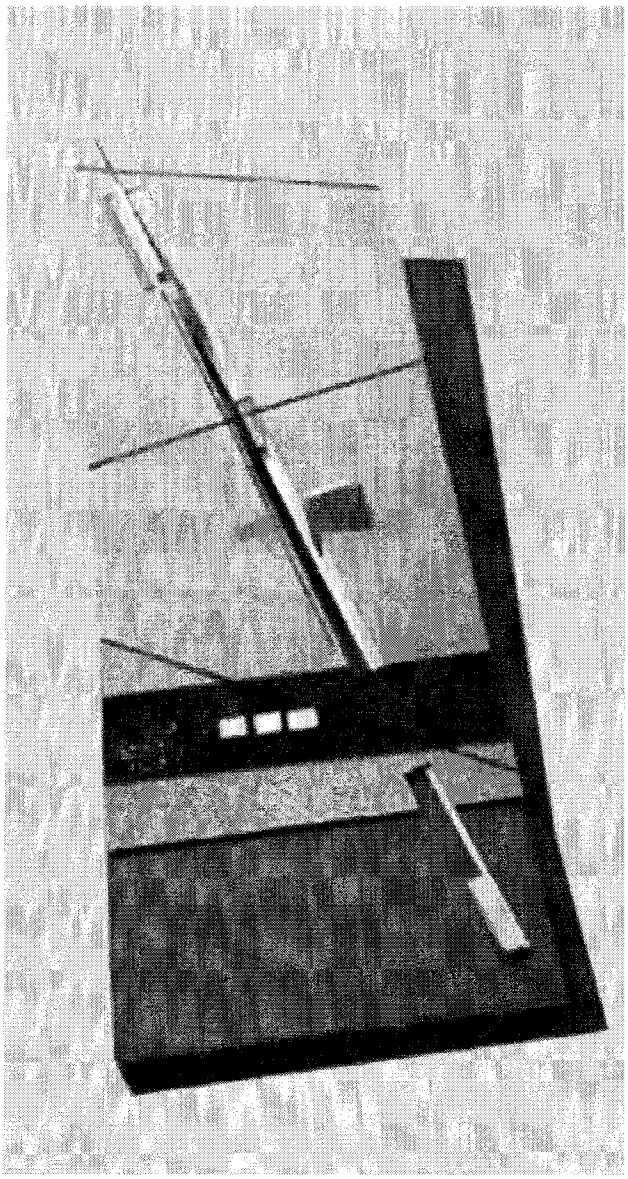
- final stage: climbing wall moves to deepest part of the deep hole pit

It is worth pointing out that these three models are intended to demonstrate only one way that the four different programs can possibly coexist. The models are intended to illustrate a sequential and symbiotic development system. For example, the climbing wall offers freshly cut granite and a safe environment that is new every year while simultaneously accommodating for a deep hole quarry system. In further demonstrating the symbiotic system and the model of coexistence, the next part of this project takes on some architectural implications a development like this might have.

PART THREE:

Gaining Ground: After 30 Years of Quarrying

An investigation through architectural means such as plans, sections and detail drawings, this third part of the research project takes on the task of representing how this project might look. Again, the intention here is not to provide a design, but rather create a scenario that illustrates possible development implementations. The scale of this architecture project ranges from landscape scale to detailing, from siting to railings. By omitting the scale of building and thereby the middle ground; this project concentrates on foreground and background, but foremost on the ground itself.

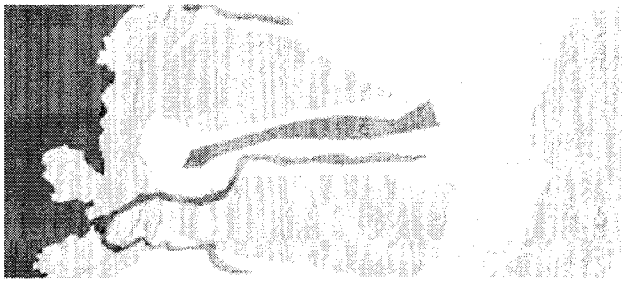


Ill. 15-Phase 3: Model illustrating the last 10 years of development

Siting a Quarry and a Eco-tourist Destination:

The study takes on the site originally proposed by the developer. An analysis conducted by the Norwegian Geological Survey concluded that the granite in this area is of extremely high quality[7]. Analysis of current conditions: a convex and concave form separated by a ridge signifies the mountain, melting water comes from the nearby glacier in two different streams, the fragile green belt by the shore includes habitats for wild animals as well as coastal and mountainous flora.

Quarry or cut: A traditional quarry cuts out a shallow crater-like shape in the landscape, while using new technologies and mobile



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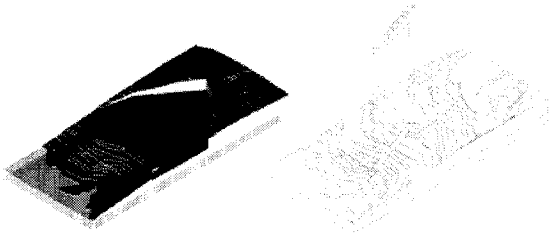

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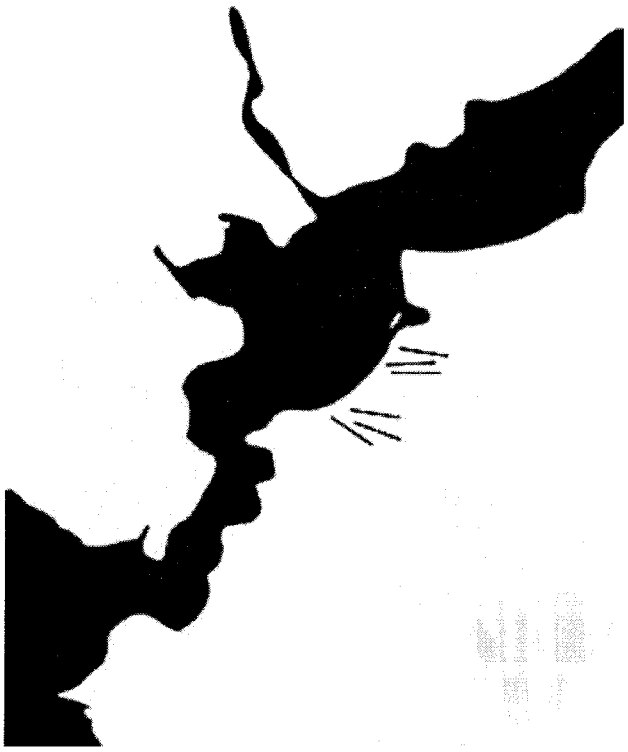


Ill. 18

equipment, one can cut deeper and slimmer. This 1000 meter long and 50 meter wide cut follows a ridge in the landscape. The quarry, then, hides behind the formation, which also functions as a noise barrier. By using existing landscape features in the siting process as well as negotiating the shape of a cut, one can greatly reduce the noise and visual impacts of quarrying.

Models illustrating both a traditional quarry as well as a **slim-deep cut** one the amount of granite removed in the slim-fit cut is about one-fifth of the open-pit quarry.

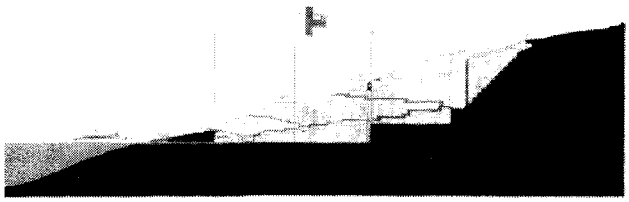
For future development, one can imagine a series of slim-cuts only partially visible by measures of topography. The relative adjacency of these slim-cut quarries has the benefit of being connected to the same infrastructure.

Slim-deep Cut, or Simply, Just Add a Fjord

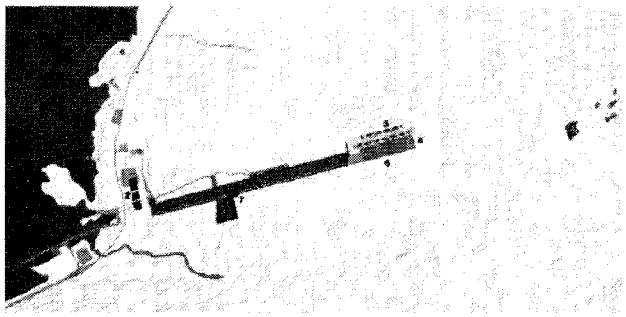
As mentioned before, the slim-deep cut combines both deep-hole and surface quarrying, creating a third way of exploiting granite. As opposed to open-pit quarrying this third way allows the existing landscape not only to be continuous, it also opens up for an unusual and also attractive place to inhabit. The next drawings illustrate how the quarry might be simultaneously used and ultimately re-used as an eco-tourist destination with local and scientific functions.

In this scenario, which is situated thirty years from the beginning of the development, the four agents in conflict over the site in first place now use the space in a symbiotic manner. The infrastructure once primarily used for quarrying now serves as access by land as well as by sea. The visitor center with rooms for researcher and a café serving tourists, quarry workers and locals is situated adjacent to the slim-deep cut. Three paths take the tourist along different nature areas around the cut, as well as inside the cut itself. For accommodation, the base camp all the way to the top of the quarry would provide cottages and a spectacular view. The east face climbing facility provides for an unprecedented three hundred meter vertical face of freshly cut granite. A serpentine-road takes one down to the quarry proper, passing by local facilities such as fish-tanks, green-houses and fruit gardens for local and regional markets. Inside a deep-hole quarry, the research center sits on the edge, allowing for a didactic study of the strata of the granite. After some years of erosion, one can imagine that the cut in landscape takes on a certain familiarity, [as the Straith of Corinth] and becomes a part of the existing glaciated fjord landscape.

At first sight, solving this classic conflict of nature management through manipulating existing production methods in quarrying and through overlaying unlikely programmatic requirements of the interest groups involved might seem implausible. It is true that the users here represents juxtaposing perceptions of nature and notions of how manage nature resources; it is also true that finding the middle ground of these has never been the goal of this project. On the contrary, the juxtaposition of opinions and programs is seen as an opportunity,



Ill. 19 Section: Illustrating the tourist destination and quarry scenario after thirty years of development, this section clarifies the relationship to the landscape as well as the ground. Note the underground connection to the fjord. The cut is accessed both by boat and vehicle through a tunnel that connects the quarry to the glacier-made [existing] fjord. Also, the melting water from the glacier is channeled through the slim-deep cut, creating the highest waterfall found in Europe.



Ill. 20 Plan: After thirty years of quarrying, the tourist destination dominates the site. Now, the 1km long and 50 m wide cut includes multiple programs developed over time along with the working quarry. The site, still known for nature's stern beauty, now contrasts with a deep cut that also has its own kind of magnificence.

not an obstacle, to develop a nonconformist or, I hope, ground-breaking solution to the conflict described above. Intended as a cross-fertilized space in which eco-tourists, quarry-workers, local dwellers and researchers coexist; the slim-deep cut quarry serves several strata of occupants as multifaceted as granite itself. In cutting their economical losses by initiating new industry, the local population might no longer be threathened by depopulation. And, as a resultant of the new inhabitants that comes with the new industry, the community will gain new ground.

ILLUSTRATIONS

Top image: Granite quarry - The photo shows a granite quarry called Rock of Ages in Maine, US. The picture is found in the quarry product catalog.

plate 1: cutting losses, gaining ground - Granite production photo From Norsk Geologisk Undersøkelse, Photo from the site's summit, Photo origin unknown.

plate 2: mountain situated in Norway's fjords - The two maps to the left are from Statens Kartverk, Norway. Jostein Bakke drew the map to the right.

plate 3: political conflict - Newspaper excerpts of the heated debate are from both local newspapers, Bergens Tidende and Bergensavisen.

plate 4: mountain value - Photo by the author.

plate 5: resorting to the mountain- Photo of Ludwig Wittgenstein's remote cottage is found in Åmås, Knut Olav, and Larsen, Rolf. *Det stille alvoret*, Det Norske Samlaget, Oslo 1994, p. 114. Photos of 19th century climbers and of Professor Arne Næss are both of unknown origin.

plate 6: tourism - Bunad-dressed staff are ready to serve dinner at Hardanger Hotel in 1896. Photo are from Underdal, Hans Martin and Eldal, Jens Christian. *Tradisjon og atmosfære*, KOM Forlag, 1996. The contemporary photo is to be found in Nord, Svein. *Hardanger*, Nord 4 Bokverksted, Bergen 1990/91

plate 7: vernacular - These four images of local vernacular are from the left: Havråtunet, then two from Agatunet , from Nord, Svein. *Hardanger*, Nord 4 Bokverksted, Bergen 1990/91. Last image is of unknown origin.

plate 8: ephemeral nature - Paul Sandby's pictures are from Schama, Simon. *Landscape and Memory*, Vintage Books 1996. Mark Tansey's painting is from an exhibition catalogue on his work.

plate 9: transient nature - Tiedeman and Gude's painting Brullypsferden I Hardanger is found in Gombrich, Ernst H., *Verdenskunsten* Oslo 1996 (1972). The paraphrase of this image is of unknown origin.

plate 10: two excavation methods - This surface copper mine is to be found in Utah, US, and the marble quarry is in Carrera, Italy. Photos of unknown origin.

plate 11: combination quarry - Again, photos of processing granite quarry is from Rock of Ages in Maine, US. The picture is found in the quarry product catalog.

Ill. 12 through 20 - These diagrams, models and drawings are created by the author.

NOTES

[1]I was contacted by the locals to consult on developing this project in July 1999. The project then leaned toward creating a Geology Park at the site. Only later did the theoretical aspects of this site interest me, and the project evolved from a practical job to a theoretical endeavor investigated as a thesis project at Harvard University. Although Cutting losses, gaining ground is grounded in an existing conflict, the problems covered here are classic nature management conflicts that occurs regardless of national borders and political systems.

[2]Statistics Norway (Statistisk Sentralbyrå) – the Buro that counts – as it claims at its web-page, is a good source for most kinds of information on Norway.

[3]For specific information on tourism and nature management in Norway and in Europe, see Ellul, Anthony (ed.): *Tourism and environment in European countries*, Council of Europe 1996

[4]For detailed information (in Norwegian) on Ludwig Wittgenstein's six visits in Western Norway, see Åmås, Knut Olav, and Larsen, Rolf. *Det stille alvoret*, Det Norske Samlaget, Oslo 1994. I translated the quote from Norwegian to English.

[5]In 1989, Arne Næss' revisited his influential 1976 book, *Økologi, samfunn, og livsstil*, and rewrote it with his translator, David Rothenberg. This radical view of

nature management and eco-philosopy is thoroughly outlined in *Ecology, community, and lifestyle : outline of an ecosophy* Cambridge [Cambridgeshire] ; New York, NY, USA : Cambridge University Press, 1989.

[6]I learned this in a visit to a granite quarry, called Rock of Ages in New England.

[7]Norsk Geologisk Undersøkelse (NGU), a governmental geology serveying agency, posts all their surveys online at www.ngu.no