From Patent -- To(wards) Prototype

by

Alaina Prokopchuk

A Practicum submitted to the Faculty of Graduate Studies of

The University of Manitoba

in partial fulfilment of the requirements of the degree of

Master of Landscape Architecture

Department of Landscape Architecture

University of Manitoba

Winnipeg, Manitoba, Canada

From Patent -- To(wards) Prototype

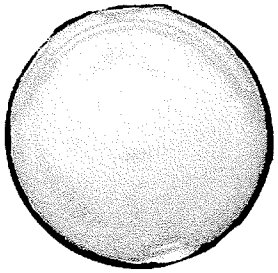
By

Alaina Prokopchuk

A Thesis/Practicum submitted to the Faculty of Graduate Studies of The University of Manitoba in partial fulfillment of the requirement of the degree

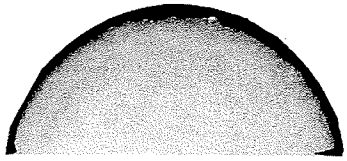
Of

Master of Landscape Architecture



Masters of Landscape Architecture
Practicum Document

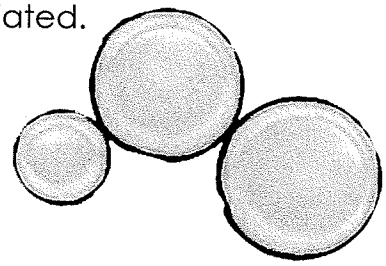
"From Patent to(wards) Prototype"

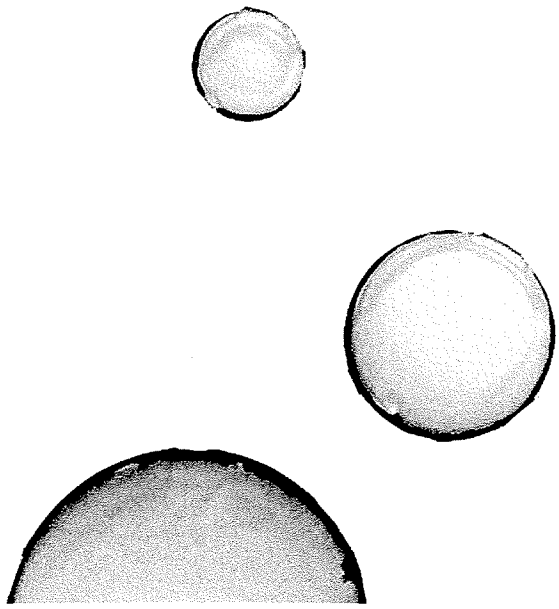


By: Alaina Prokopchuk

2008

Many thanks to my family, friends and colleagues who have been so supportive and encouraging throughout this process. Special thanks to my advisory committee Dr. Richard Perron, Professor Ted McLachlan and Professor Cliff Eyland. Your knowledge, direction and input has been greatly appreciated.





contents

Statement of PURPOSE:

The design of a product called sWell which was conceived in the studio environment, served as the precursor to its continued development after the completion of the course. This practicum titled, "FROM PATENT—TO(wards) PROTOTYPE," has been the process of turning concept into reality: to explore the process of design idea, through to patent, to(wards) prototype; attempting to construct a functional prototype model and/or market product. This practicum is to present not only a personal reflection but also serves to inspire, or provide semi-instructional precedence to those in the studio environment who wish to follow a similar conduit or venture.

BACKGROUND:

This practicum was originally derived from personal studio work produced in a Masters of Landscape Architecture Studio course titled, Flood Architecture. The project explores notions of bodily swelling in relation to the context of a flooded landscape. The initial goals were as follows: To engage the realm of landscape architecture as a means to: PROMOTE the advancement of sustainable flood architecture, disaster relief support and filtration/membrane technologies; to INCREASE awareness of, and respond to regional, national and global water issues; the social, political and the ecological; to EXPLORE and REVEAL the intrinsic relationship between science and design/imaginative perspective; and finally, to PROVIDE an additional source of re-usable or potable water. The previously designed sWell, an inflatable, portable filtration product, is the vehicle or instrument of engagement. The initial concept or framework is based on biomimicry, or using natural biological systems to inform design decisions, "this revolution is founded on nature's surprisingly effective design principles, on human creativity and prosperity, and on respect, fairplay, and goodwill" (Braungart & McDonough, 6). The purpose was to create a self-sustaining filtration product, which filters flood water into potable water in the event of a disaster. The outcome was product design; the product is a solar-powered, mobile, inflatable filtration unit titled a sWell. The form and functions of these free-roaming modules are analogous in part, to the structure and utilities of cellular eukaryotes. These units are to act as water storage tanks and filtration devices in rivers, lakes and flooded areas, both in times of flood and within homeostatic environments. This practicum revisits this work and uses it to structure the dialogue of the process of obtaining a patent and then seeking aid in sWell's construction and market development.

document premise & structure

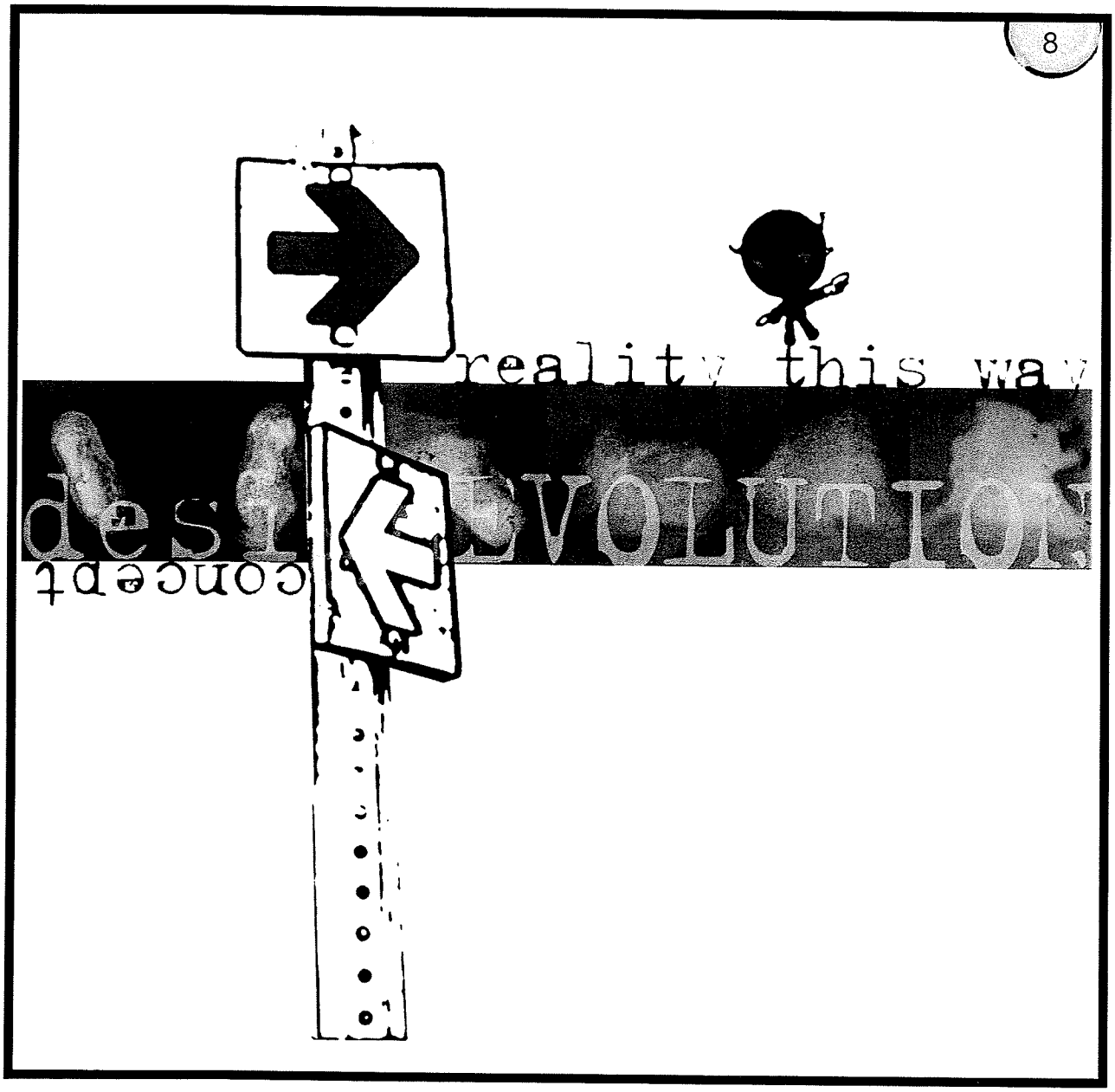
METHODOLOGY:

The winning of a design competition for the water filtration unit called sWell, and its subsequent media interest; resulted in the acquisition of a provisional patent. The methodology of this practicum is this labyrinthine, multifarious process of navigating through the milieus of creative endeavor, social activism, and entrepreneurial ventures.

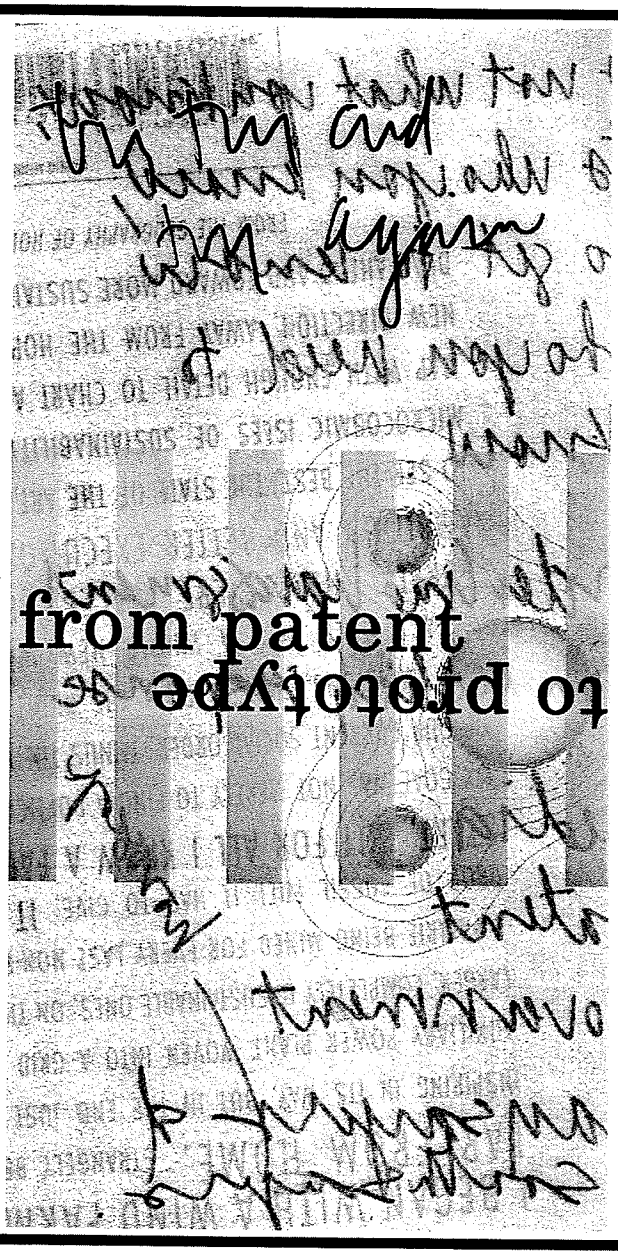
The document is the narrative that serves as the explanation of the practicum. It is comprised of a combination of written and graphic representation, presented through a variety of possible media; written text, film, design and detail drawings, graphic and 3D imaging.

The writing style is running, explanatory prose composing an informal or experiential narrative punctuated with graphic exploration. The title, "FROM PATENT—TO(wards) PROTOTYPE," suggests a chronological order or sequence of moving from concept to reality; having an idea (patent), and then manufacturing it into the tangible (prototype). This process however, has been anything but straight-forward or sequential. The final presentation expressed the navigation through the fickle enterprise of invention. The document is essentially a detailed version of the Practicum presentation in text and imagery. This is then followed by the appendices which include: the studio work for sWell, Competition Entries and Briefs, the Market and Feasibility Study, the Patent Document, and the Literature and References Review. they navigate through the fickle enterprise of invention.

When I first sat down to do this presentation, I started to think of a way to present or convey the information that wasn't entirely bland or prescriptive, ie: 'for example, I did this, and then I did this and that, and then this and so on. When I think about what this whole process has been to me, a huge part of it has been to remove myself from my zone of comfort. In some ways I have had to detach from the work and become somewhat of an unbiased participant. This experience has taught me to set feelings of personal affronts aside and to be critical in a reflective way. As soon as you leave the setting of Academia and are presenting your ideas outside of that, dealing with people in a variety of environments, it becomes a very different experience. The way I dealt with these pressures was to separate myself from them. My graphic representation or the way in which I am illustrating this story is through the creation of what I call my alter ego, my 'thicker skinned' version of myself, called, El Diablo. I use graphics as a tool or means to work-through and articulate my thoughts and ideas. Representation through this character or alter ego has become the means for which I have structured my thoughts and graphics.



The title of this practicum is, "From Patent to(wards) Prototype." What preceded this was "Concept," which essentially was the studio. The practicum is the evolution of what has occurred since the conclusion of that studio course.



The title page imagery represents a synopsis or outline of the project. The background scan is from Chris Turner's book, *A Geography of Hope: A Tour of the World we Need*." The book itself signifies the vast amounts of research and literature involved in this project, but also emphasizes the importance of sustainability, activism, and the environment. The inclusion of the barcode was intentional as it alludes to the forces of business and commodity. The background is then overlaid with sketchbook writings to denote personal reflection; "try, try, and try again," has become a personal mantra. The slat-like images are taken from a personal picture of a moving landscape—cut into stages of progress. A chronology, but a blurred one. The bars also resemble litmus paper strips—the testing of the waters, both literally and figuratively. The text, specifically, the 'towards', is moving backwards, representing the '2 steps forward and 3 steps back'adage. The water molecule pays tribute to the scientific and technological aspects inherent in this project.

"Global consumption of water is doubling every 20 years, more than twice the rate of human population growth. If current trends persist, by 2025 the demand for fresh water is expected to rise 56% above the amount that is currently available..."

--Barlow

From the onset, this project has been about water—fresh water is becoming a heavily commoditized and scarce resource, when it should be a fundamental right of every individual. When there are sources of water available, albeit unusable (like flood grey-water), these unusable sources of water must be made useable. We can achieve this through DESIGN.

The following quotes highlight or recap the various aspects or predominant themes of this process; water, science, design, social activism, and business.

"For most of us, **design** is invisible. Until it fails. Accidents, disasters, crises. When systems fail we become temporarily conscious of the extraordinary force and power of design, and the effects that it generates. Every accident provides a brief moment of

awareness of real life,

what is actually happening and our dependence on the underlying systems of design."

--Bruce Mau

Landscape Architecture is a broad and diverse field which relates and translates into a variety of disciplines. While this project may not follow a conventional or traditional formula, it has evolved from a studio project in a flood architecture course. The realm of creative design is one that is vast and inclusive, blurring the boundaries between science, imagination, landscape and culture.

"Floods have been the number one cause of disaster from 1991 to 2005..."

--International Strategy for Disaster Reduction

"Floodwater often contains infectious organisms, including intestinal bacteria such as E. coli, salmonella and shigella; hepatitis A virus; and agents of typhoid, paratyphoid and tetanus..."

--Red Cross

"According to the Red Cross, in our world today more than one billion people do not have access to clean water and some four million people die each year from diseases associated with the lack of access to safe drinking water, inadequate sanitation and poor hygiene..."

"There are about 700 water companies in the world with a

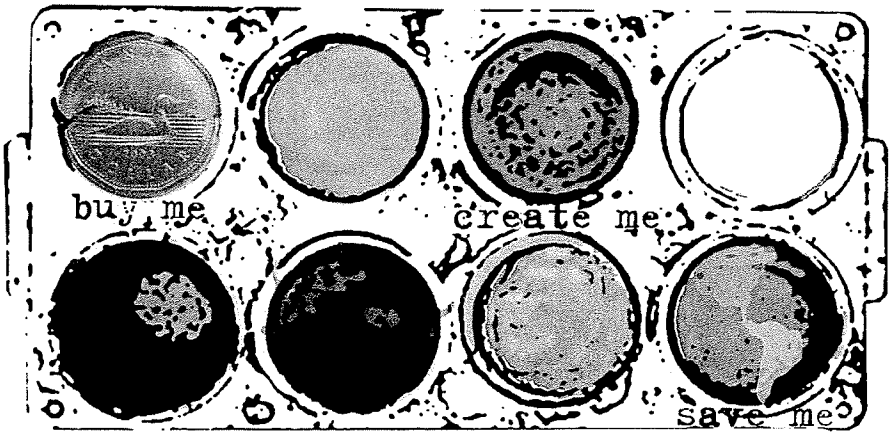
market capitalization of about 1.7 trillion...

water; quite simply is recession proof..."

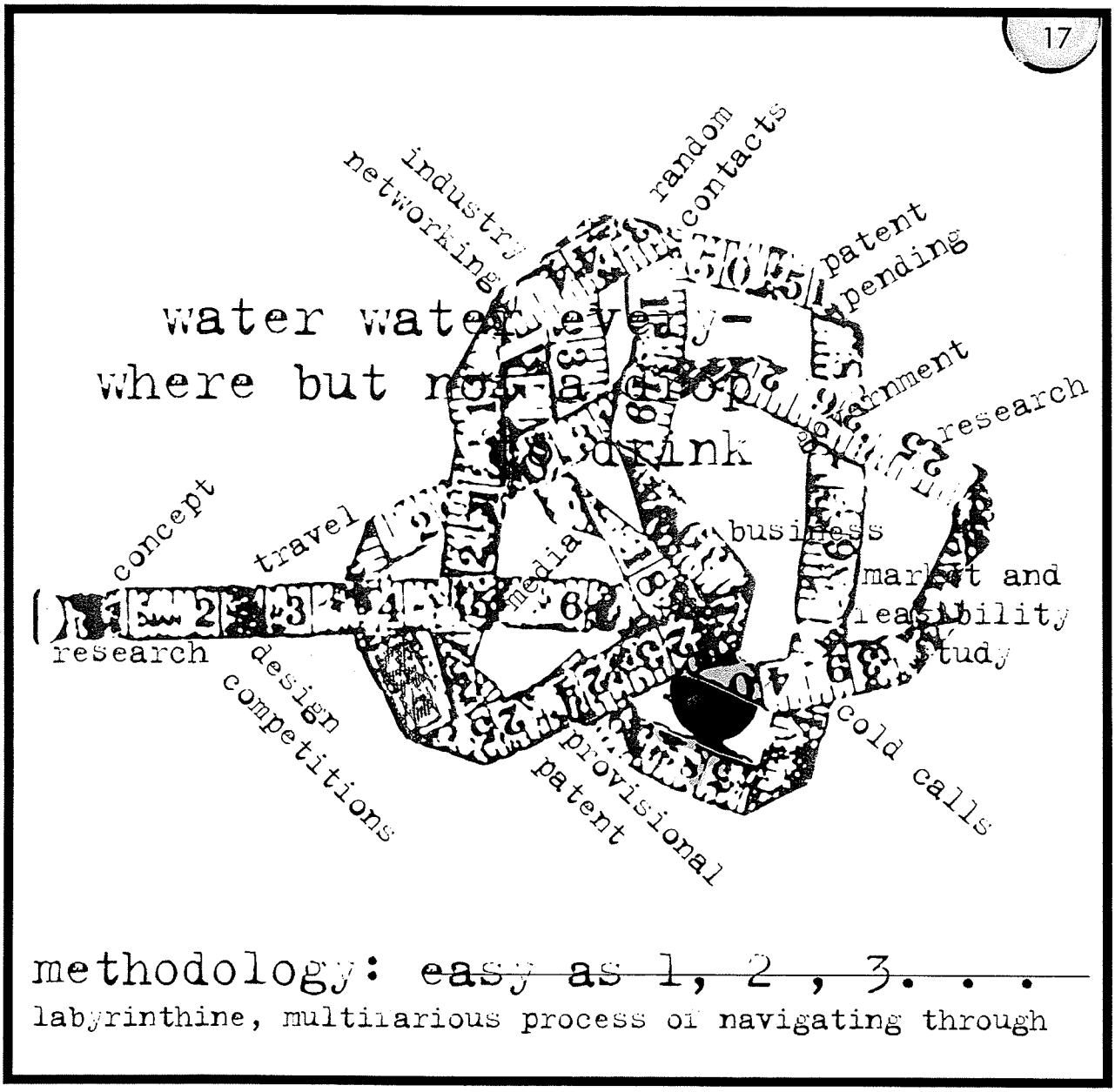
--Ian McPherson, Criterion Investments

"Goldman Sachs estimates that the **400 billion** USD water distribution, purification and infrastructure sector is **expected to grow** by 4% to 6% a year in most developed countries, and as much as 15% a year in **emerging markets..**"

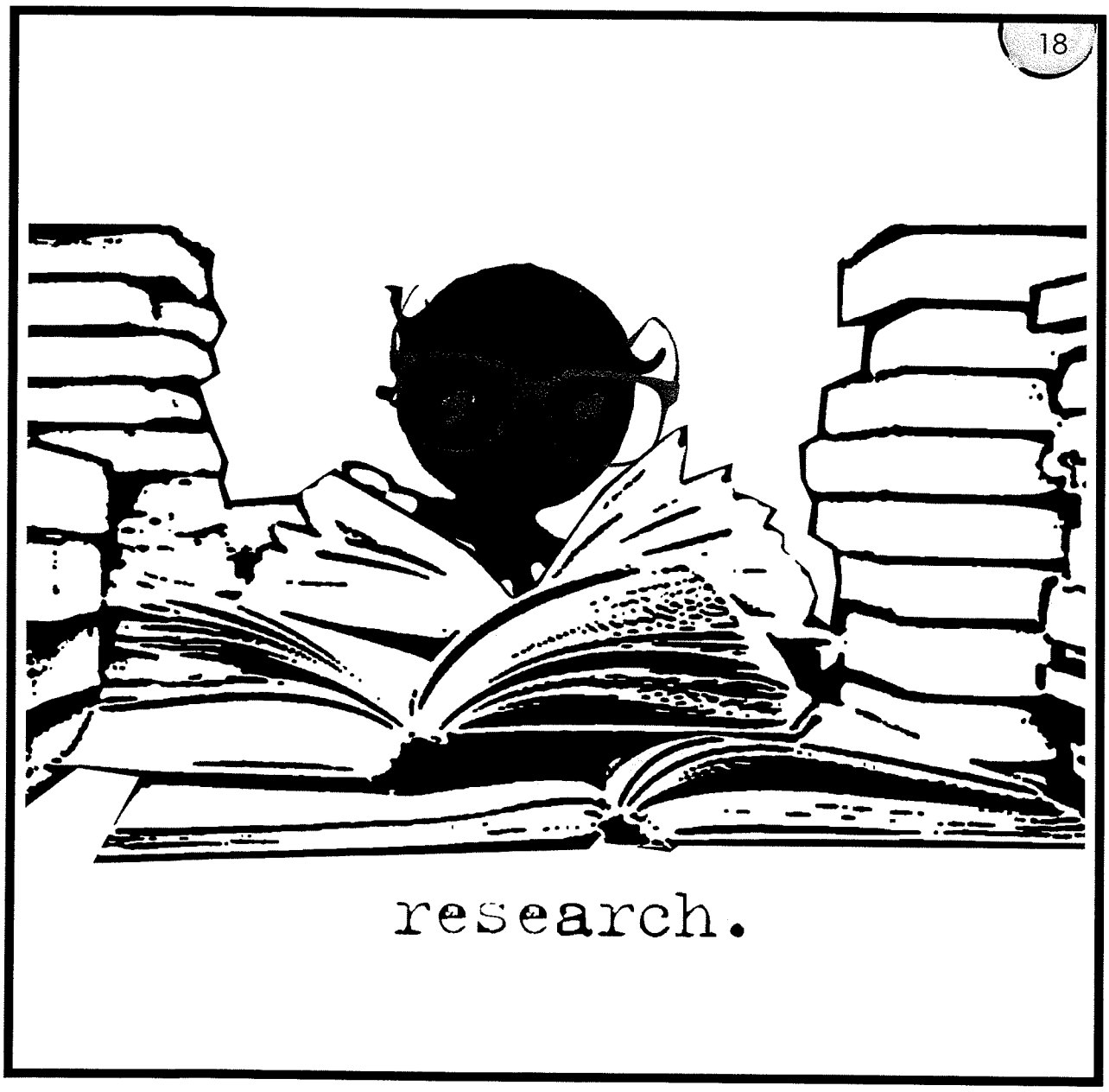
creative endeavors
social activism
entrepreneurial ventures



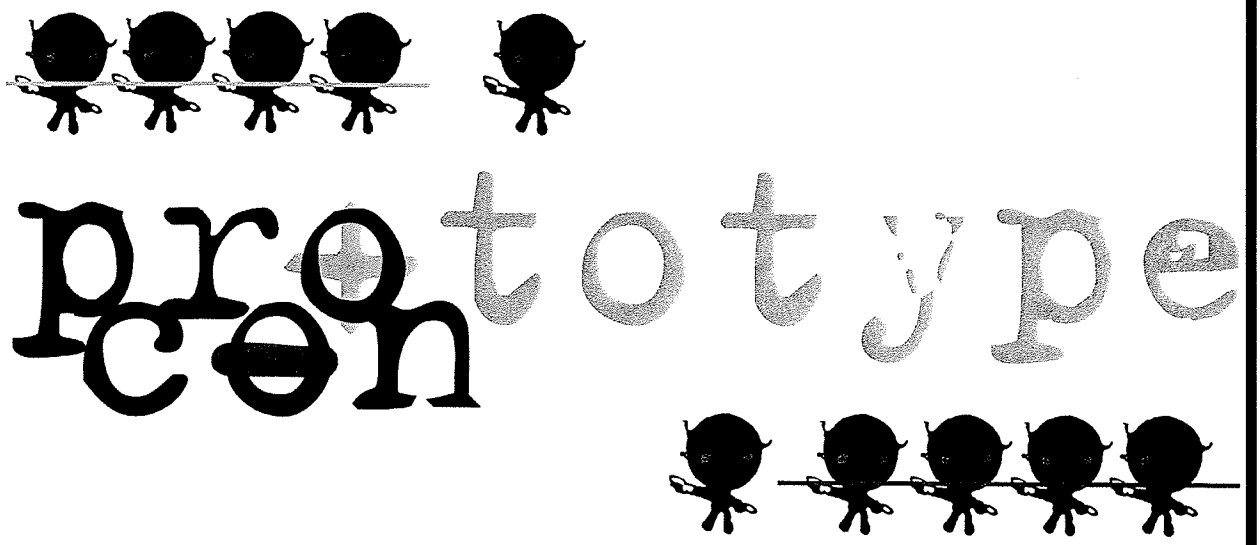
The winning of a design competition for the water filtration unit called sWell, and its subsequent media interest; resulted in the acquisition of a provisional patent. The methodology of this practicum is this process of navigating through the milieus of creative endeavor, social activism, and entrepreneurial ventures.



The methodology has been a labyrinthine, multifarious (diverse & twisted) process of piloting through the varying worlds of design, science, society and business. It has embodied the 2 steps forward 3 steps back adage.



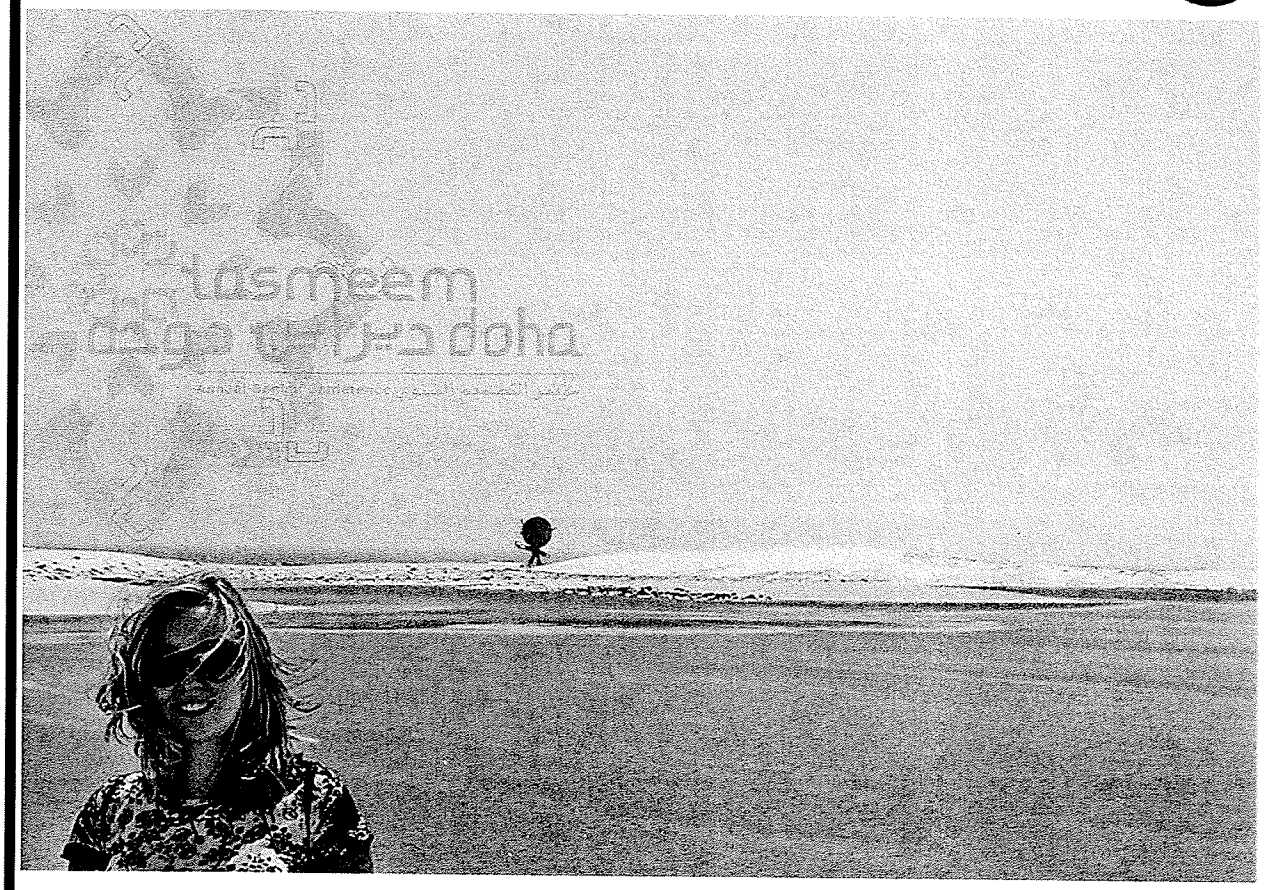
However, one aspect of the methodology that has occurred throughout the entire process and remained constant is research. Research of initial ideas and concepts, of technologies, of competitions, of various companies and contacts, government agencies and departments, patent law, opportunities for funding, and so on.



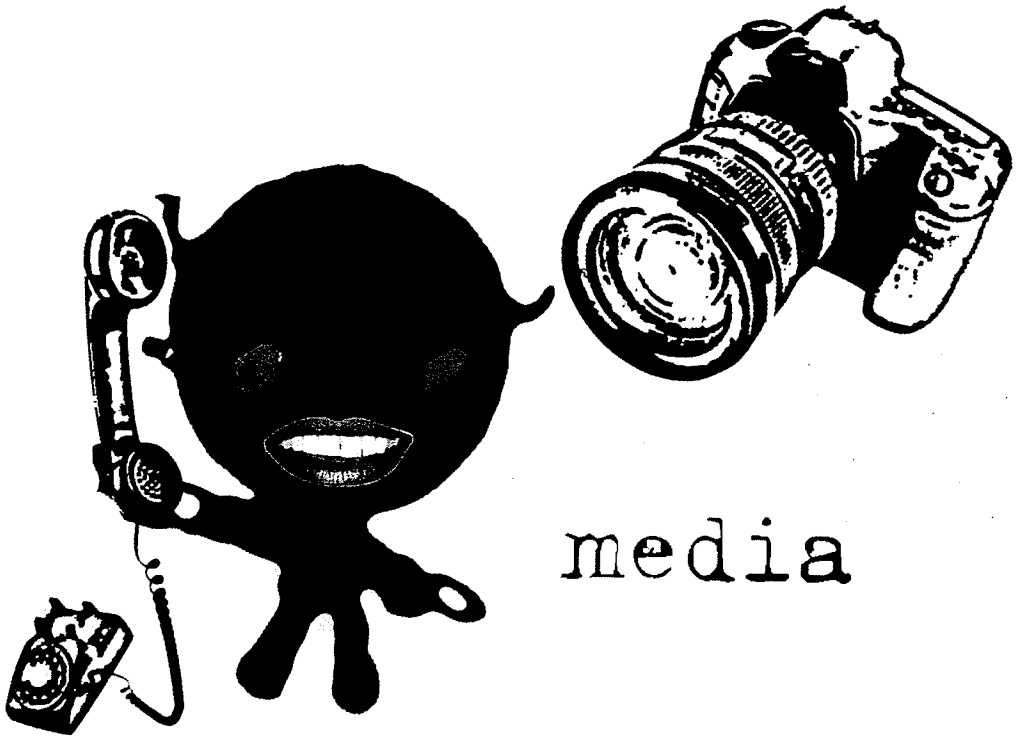
This process has been both positive and negative, and facets of both are present throughout the narrative. This whole experience is something that just sort of happened—while I had not initially actively sought sWell's further development, it has taken on a life of its own and has brought on many new opportunities and experiences.

design competition

Design competitions have served as the catalyst to this process. If students take anything away from this project, it is to not underestimate the benefits and outcomes of entering design competitions. There are many opportunities available, and often times, it becomes only a matter of re-packaging and modifying your projects to fit with the criteria and themes of the competition.



The winning of the *DOHA Sustainable Student Design Competition 2007,* enabled me to travel to the middle-east and attend a design conference. If anything, having been given the opportunity to travel and to meet many international design professionals and students, has made this whole process worthwhile.



The winning of the design competitions generated media interest. At times the notion of 'self-promotion' was really uncomfortable, but also beneficial too, for exposure. The project has appeared on *CBC*, in the *Winnipeg Free Press*, *University of Manitoba* publications, *Winnipeg Women*, and others. Some articles are essentially general précis's of previous articles—and therefore, aren't entirely accurate in their facts or statements. Occurrences like these, have taught me to be a more informed and critical reader. With media exposure, here enters issues concerning public disclosure and intellectual property rights.

Intellectual Property.

Information regarding the logistics as to IP assessment, public disclosure, applying for a patent, and market assessments etc., is readily available through many resources. The practicum is not about these procedures; rather, it addresses my own experience of going through these actions, not necessarily the detailed steps themselves. However, the following information summarizes some of these ideas and possible routes.

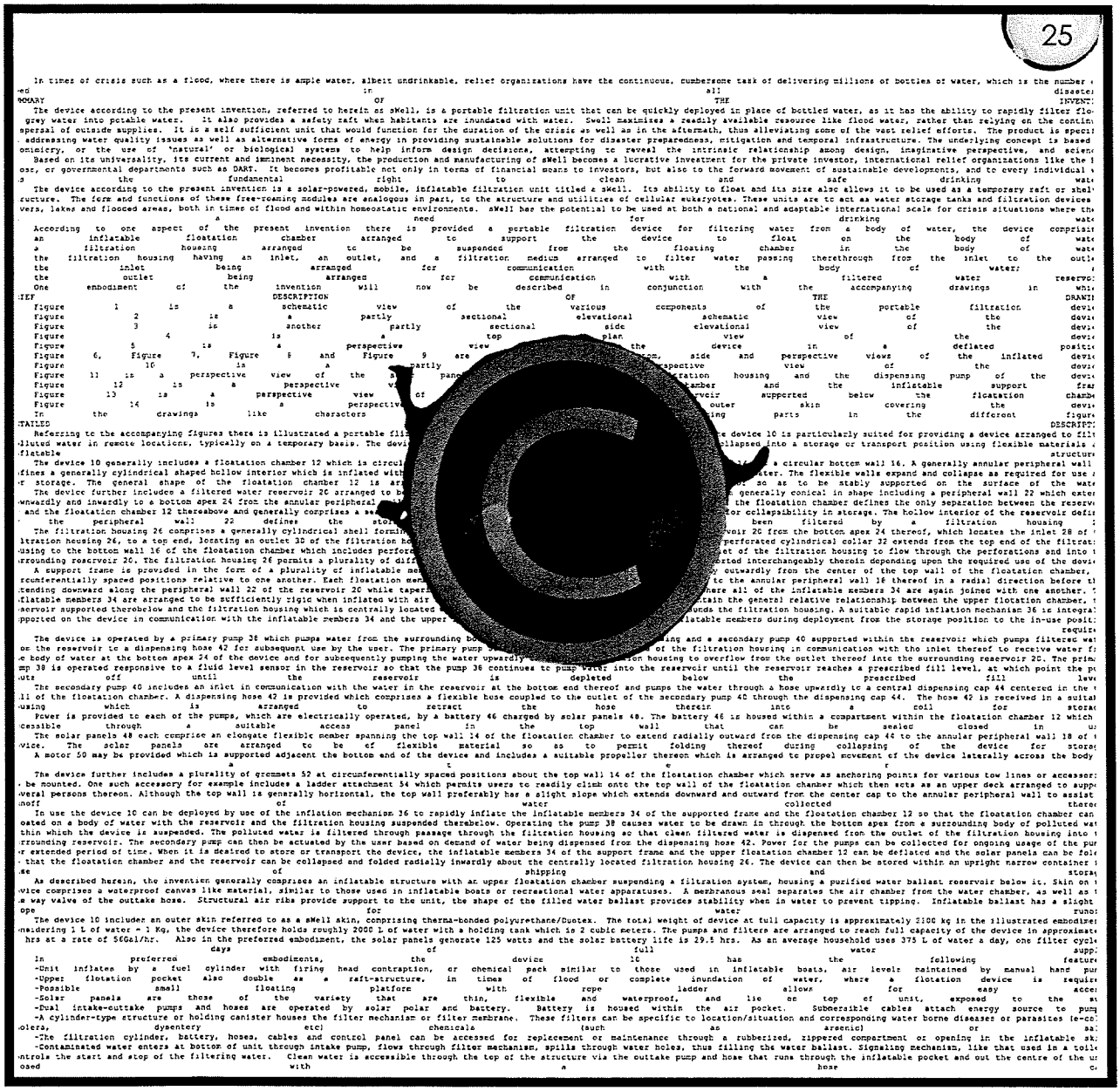
- The **Intellectual Property (IP) Assessment** will undertake the following:
- 1. Prior Art Search and Evaluation
- A search of patent and literature databases is undertaken to locate any potential patents and publications in the field that may limit patentability or freedom to operate
- Determine the impact of the prior art on patent-ability (i.e. Does the invention satisfy the patent-ability requirements of novelty, non-obviousness, and utility?)
- 2. Investigation into third party ownership of the invention
- Determination of funding sources and any transfer of rights that may have occurred with such funding
- Investigation into the role of other institutions in the research, if any
- 3. Public disclosure of the invention
- Determination of which aspects of the technology, if any, have been publicly disclosed
- Understanding how such disclosures may impact the IP protection strategy for the invention
- 4. **Patent Strategy**
- Given the above information, a patent strategy is formulated to indicate whether a patent should be filed, and if so, when, and in what countries.
- The researcher will be asked to participate in the analysis of the prior art, and will receive a copy of the IP Assessment once completed.

Market Assessment

- The Market Assessment will undertake the following:
- 1. Overall market opportunity
- Identify market needs and trends, and demographic factors which influence the market.
- Estimate of market scope
- Identify potential target markets
- 2. Competition and prospective licensees
- Companies selling similar products
- Identify and gather intelligence on competition: market dominance, strengths/weakness
- A comparison is made of the proposed technology with those which are currently available or published research
- 3. Notable market characteristics
- Distribution channels
- Potential licensees identified
- Possible commercialization routes

Taken from the University of Manitoba's Technology Transfer Office

the basic steps



I have applied for, and obtained an official North American (US/Canada) Patent. Serial number: 12/025,396. It is essentially a concept patent as it packages pre-existing technologies in a novel way. The sWell is innovative as it uses existing technology such as solar energy, filtration, pumping systems and inflatable material to form the product. There are no other products in the marketplace that exactly match the sWell. Creative innovation can be found in application, not necessarily in the technological apparatuses themselves. It is identifying a situation or need that is not being fully met and and using existing technologies or ideas in a new way or approach.

the patent

"I thought they would of had this invention decades ago.....I dont see whats so special about it. . ."

"General rule suggests that of 100 patents granted, approximately 10 actually hit the market and one succeeds financially."

-- Fred Amram, professor, University of Minnesota

reality of invention

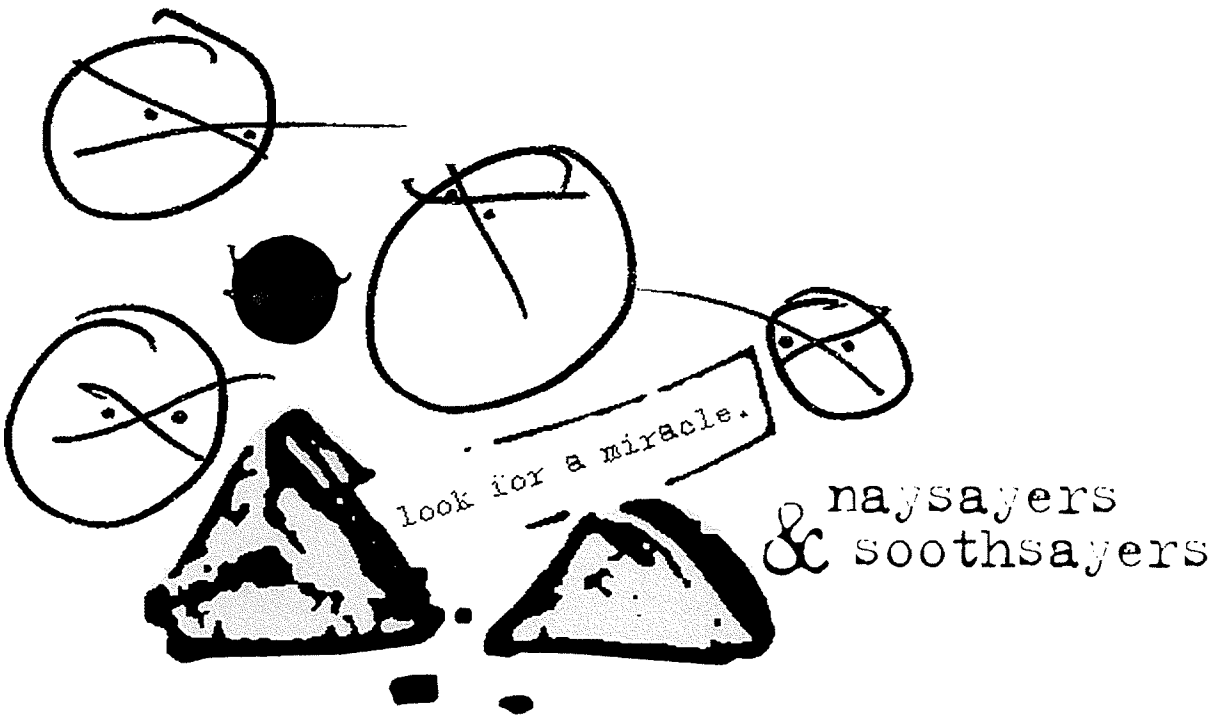
The following is an excerpt of an open letter I had written in my sketchbook. After an interview with CBC and a *Winnipeg Free Press* article in regards to the project, there apparently was a blog concerning my 'invention' on a Winnipeg internet site...

I was really surprised when I friend of mine made the comment that she had 'read my blog' on the internet, and I have to admit I was curious as I had no idea what she meant. After reading the discussions generated on one site, I wanted to add to this dialogue, responding to some of the statements made. It became a good first-hand lesson that forms of the media are not necessarily accurate, balanced or whole in their representation. Making blanket statements while not really knowing someone, or their work is a proverbial, slippery slope, so to speak.

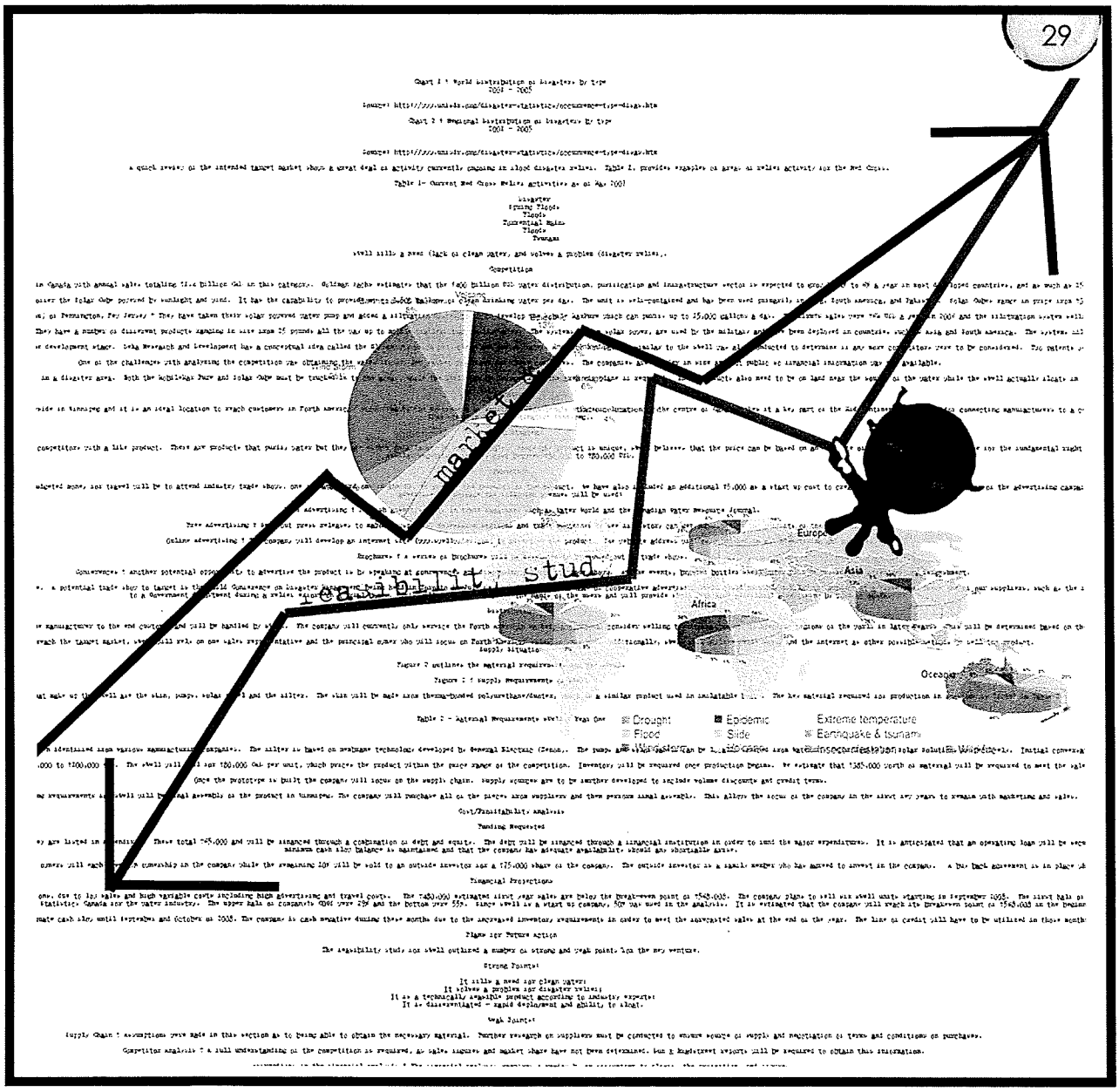
Firstly, I am not 'claiming' to be anything I am not, especially an ingenious inventor or mastermind water-guru, for which I am clearly neither. I am not even a 'scientist'. What I do feel I am however, is a concerned student who saw a problem that wasn't being addressed in its entirety, and tried to make an honest attempt at one of many possible solutions. I fully agree with the statement that "most inventions are modifications of something already made." Creative innovation can be found in application, not necessarily in the technological apparatus themselves. It is identifying a situation or need that is not being fully met and using existing technologies or ideas in a new way or approach. The comment was also made, "I thought they would of had this invention decades ago.....I don't see what's so special about it." This is my point exactly. It's a simple idea, with some tweaking, that based on my research, was not being employed. A good idea doesn't have to be 'mind-blowing' or 'earth-shattering' to be beneficial.

I love conspiracy theories as well, but this next comment missed the point: "... this filtering water idea sounds like some left-lib conspiracy, though. Our water's fine, i tell ya, just fine, and i don't need some jerk scientist with their so-called "education" telling me otherwise. I've started drinking tap water again." I drink tap and even lake water too. If you had read the full article you would know this. My purpose, at the very least was to create awareness for those who do not have this same luxury, which represents the majority of the planet. We are lucky that our water here is fine, for the time-being, and people should be more aware and self-educated about what the media and advertisements propound. But unfortunately, it is no conspiracy that millions of people in this world do not have even remote access to clean water and sanitation. The project, in part, was in response to the ever-increasing commoditization of water and the current trend of so-called 'designer water'.

a bit of a rant

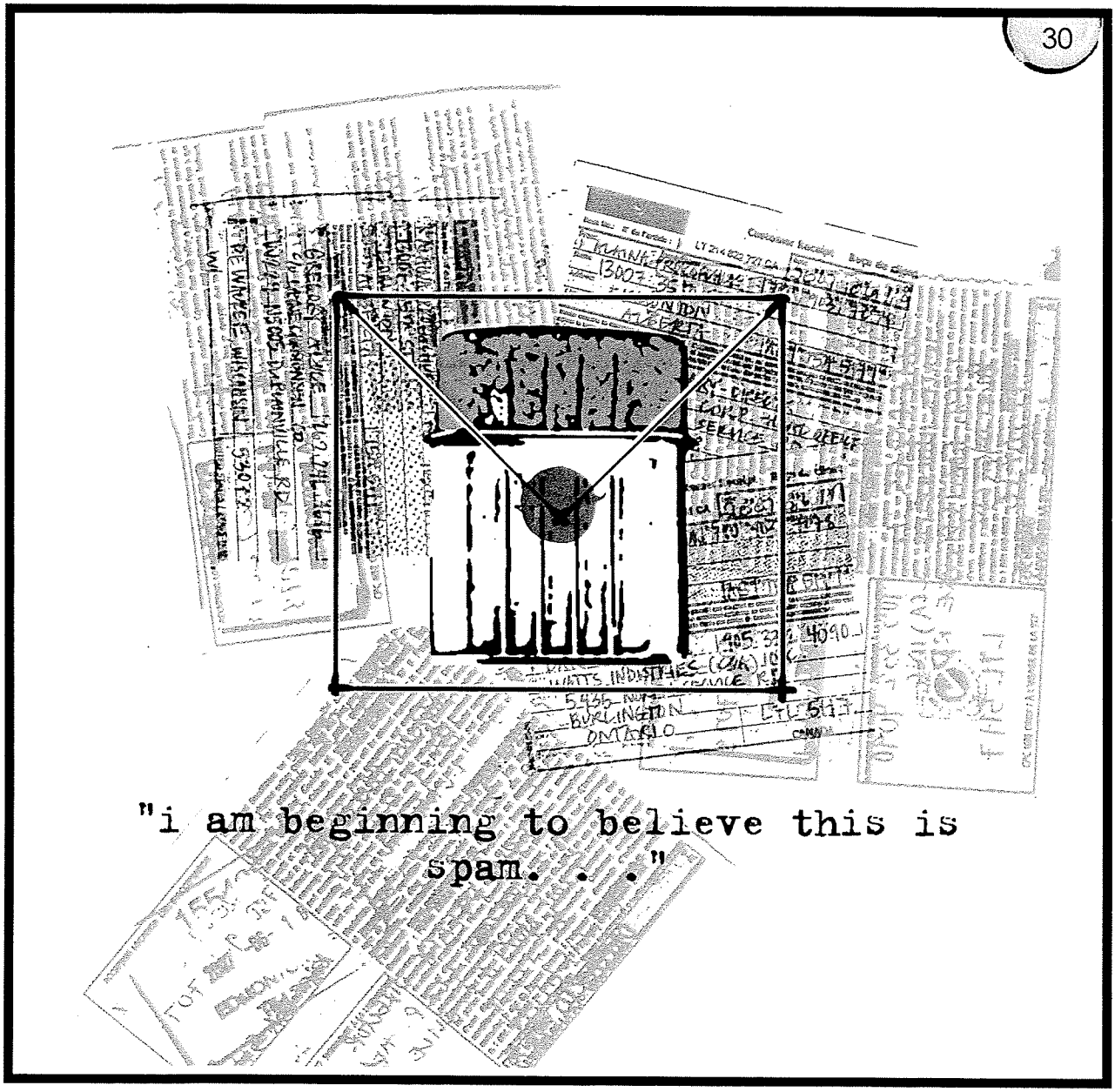


There will always be those that encourage and support, and those that *discourage* and impede. I have learned not to have unrealistic expectations and to focus on the many positive comments and feedback. But, I have also learned to *look for miracles*.



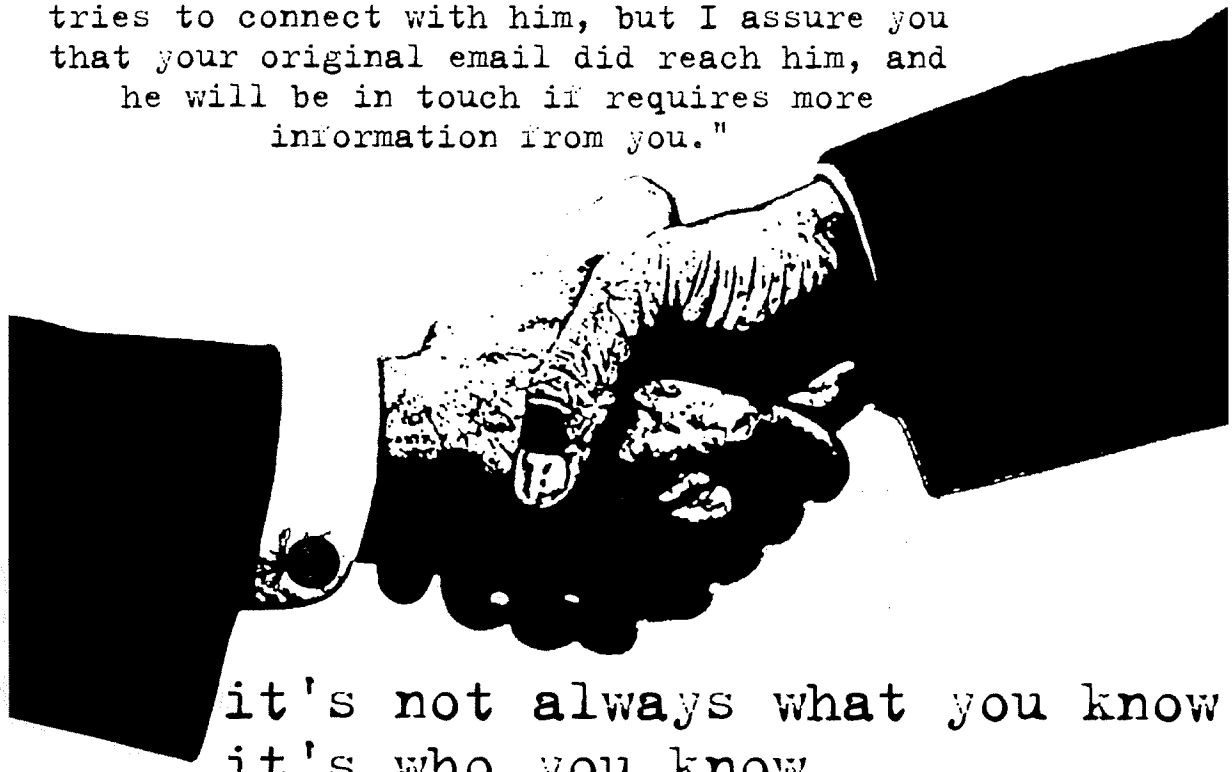
Due to the technological and production requirements of sWell, a well established partner is needed to be able to provide the necessary expertise and resources to initiate prototype testing, production and marketing of the product. The concept is very feasible as the technology is available and has proven to be effective in other applications. Initial meetings with the National Research Council and experts in the water filtration industry have indicated that the concept is technically feasible with some minor modifications required to the conceptual design. At the moment, there is no working prototype for the sWell, the first course of action would be to build a functional model.

market & feasibility study



3-2-1—Contact! I have sent a barrage of emails, packages, requests, inquiries, phone-calls, and letters—to innumerable government agencies, water and environmental organizations, business contacts, investors, and companies.

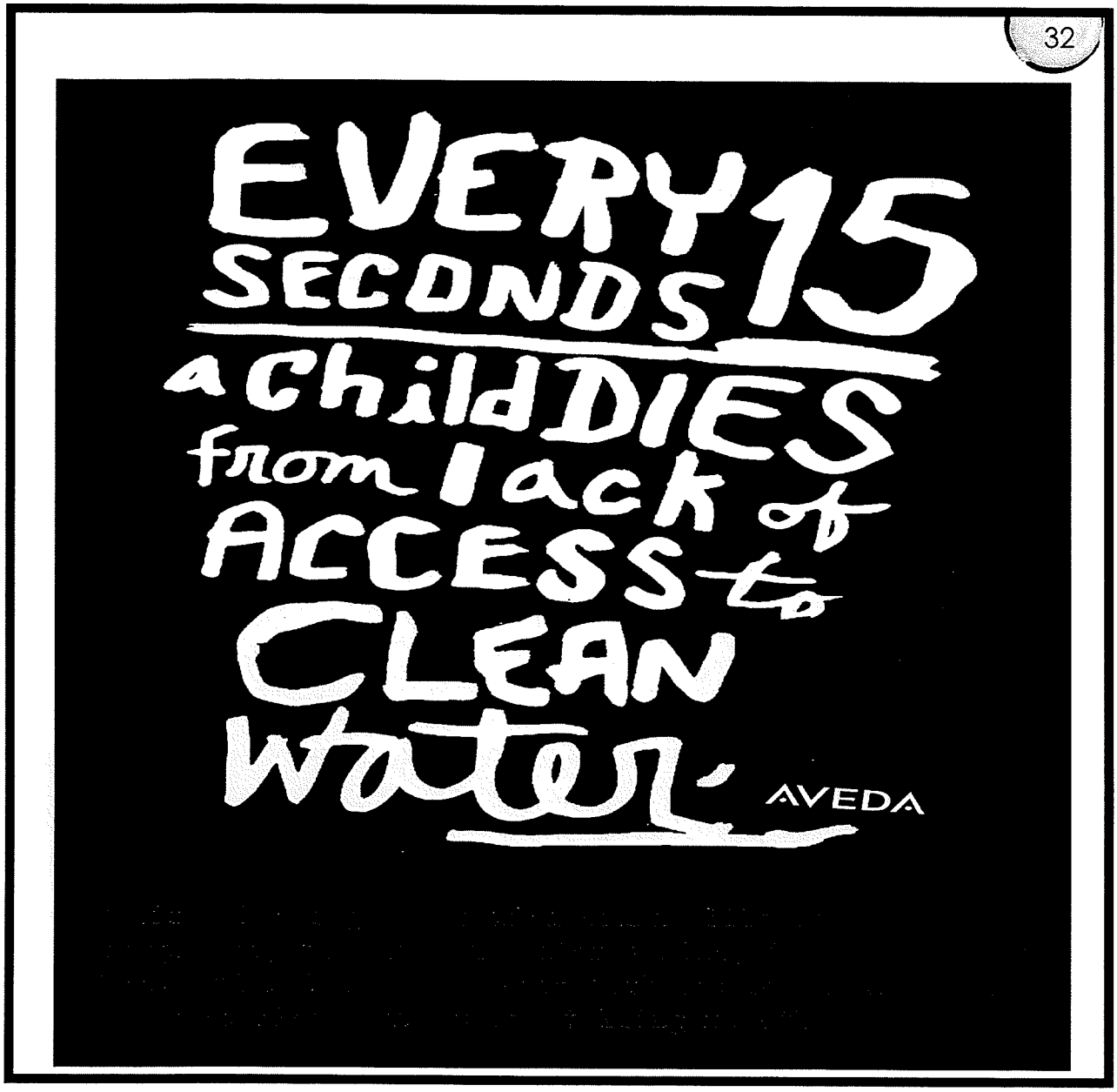
"As I'm sure you can appreciate, "Mr. X" cannot personally respond to everyone who tries to connect with him, but I assure you that your original email did reach him, and he will be in touch if requires more information from you."



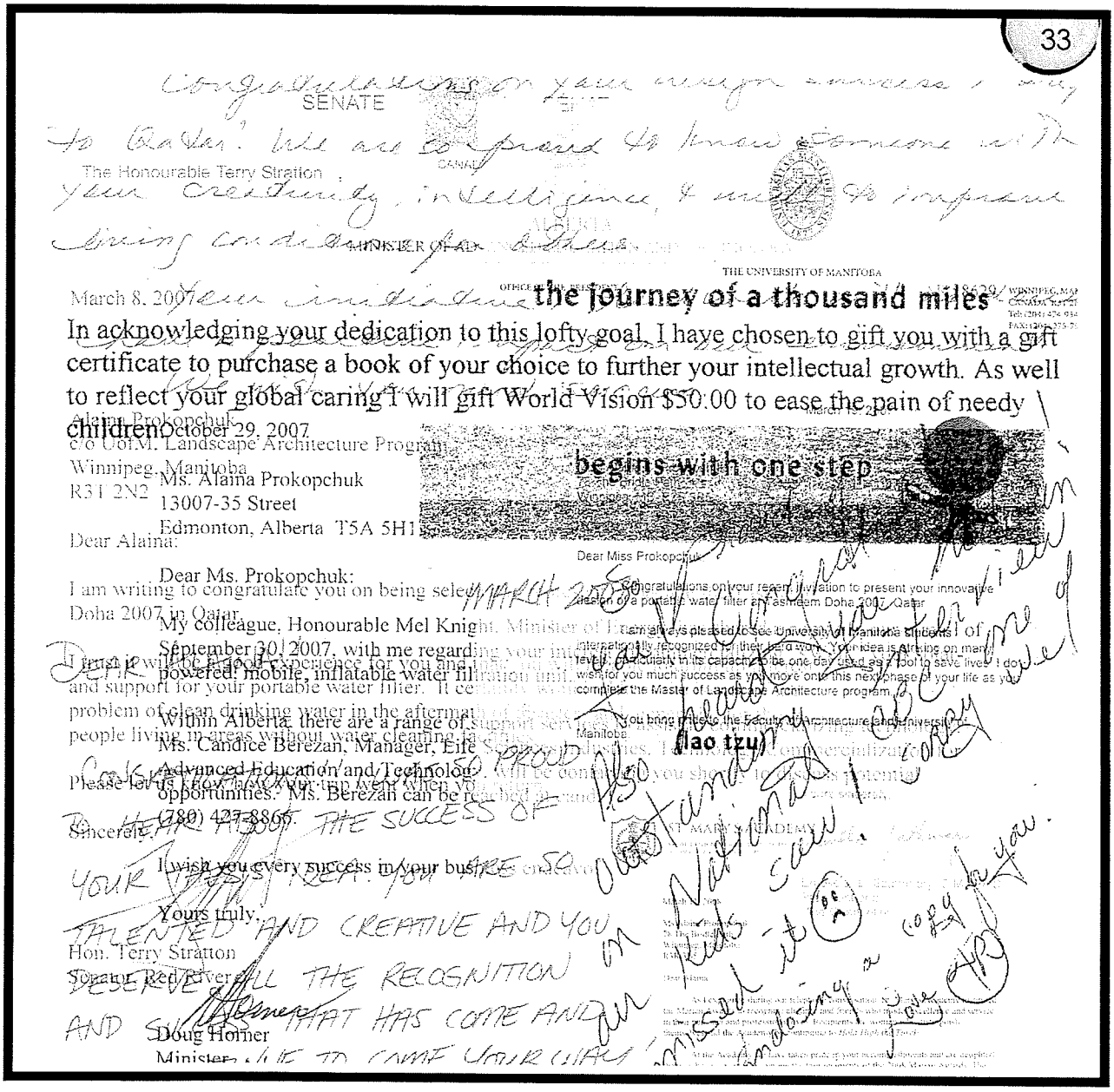
it's not always what you know
it's who you know
so get to know
who you need to know.

"I am very enthusiastic regarding your project and must admit I would very much like to offer you some assistance in its development."

Initiating and arranging meetings or contacts requires vast amounts of time, effort and patience. It can be both frustrating and rewarding. The quotes incorporated in these graphics, while remaining anonymous, are actual comments and statements made in various conversations, letters and emails I have received.



A project with a humanitarian aim seems to garner interest and attract like-minded people. It has been amazing how many people have initiated contact and offered support in regards to the project. It has brought it back to the main initial purpose, which was to create awareness about the issues surrounding water. But, there are still those, who no matter how you articulate yourself, or explain the issues, that just don't get it, and you have to learn to be ok with that. The two quotes in this graphic represent this dichotomy.



SENATE

The Honourable Terry Stratton

MINISTER OF ALL

THE UNIVERSITY OF MANITOBA

March 8, 2007

the journey of a thousand miles

In acknowledging your dedication to this lofty goal, I have chosen to gift you with a gift certificate to purchase a book of your choice to further your intellectual growth. As well to reflect your global caring I will gift World Vision $50.00 to ease the pain of needy children.

Alaina Prokopchuk
c/o U of M. Landscape Architecture Program
Winnipeg, Manitoba
R3T 2N2

October 29, 2007

Ms. Alaina Prokopchuk
13007-35 Street
Edmonton, Alberta T5A 5H1

begins with one step

Dear Alaina:

Dear Miss Prokopchuk

Dear Ms. Prokopchuk:

I am writing to congratulate you on being sele

Congratulations on your recent invitation to present your innovative design of a portable water filter at Tashkeem Doha 2007 Qatar.

We are always pleased to see University of Manitoba students

Doha 2007 in Qatar.

My colleague, Honourable Mel Knight, Minister of

September 30, 2007, with me regarding your in

I trust it will be a good experience for you and

powered, mobile, inflatable water filtration unit.

and support for your portable water filter. It ce

problem of clean drinking water in the aftermat

Within Alberta, there are a range of

people living in areas without water cleaning fa

Ms. Candice Berezan, Manager, Eife

Advanced Education and Technolog

Please let us know how your trip went when yo

opportunities. Ms. Berezan can be r

(780) 427-8866.

Sincerely,

I wish you every success in your busi

Yours truly,

Hon. Terry Stratton

Speaker, Red River

Doug Horner

Minister

Congratulations on your recent invitation to present your innovative design of a portable water filter at Tashkeem Doha 2007 Qatar.

We are always pleased to see University of Manitoba students

You bring pride to the Faculty of Architecture and University of Manitoba

(lao tzu)

It has been very surprising and cheering to receive so many well wishes. You never know where the next contact or opportunity comes from, and it is important to keep an open eye and ear for the next, new possibility. This has also taught me the power and importance in commending others for their work and to offer my suggestions and support in their own endeavours.

Prepare to pitch to the Dragons at CBC audition

THE Dragons are returning to their Den, and this year they're particularly eager to feast on the ideas and aspirations of student-aged entrepreneurs.

The hit CBC series *Dragons' Den* will bring its third-season audition roadshow to Winnipeg next week, holding tryouts for the show on Saturday, April 12, from 11 a.m. to 7 p.m. at CBC Manitoba, 541 Portage Ave. The series features a panel of successful business tycoons — the so-called "dragons" described in the show's title — who field pitches from aspiring inventors and entrepreneurs seeking cash investments in their business ideas.

This year, the show's producers are putting a special emphasis on university and college students, as well as other young entrepreneurs whose ideas are both promising and entertaining.

Auditioners are required to apply online and bring a completed copy of the application form to the audition. Full details are available online at www.cbc.ca/dragonsden.

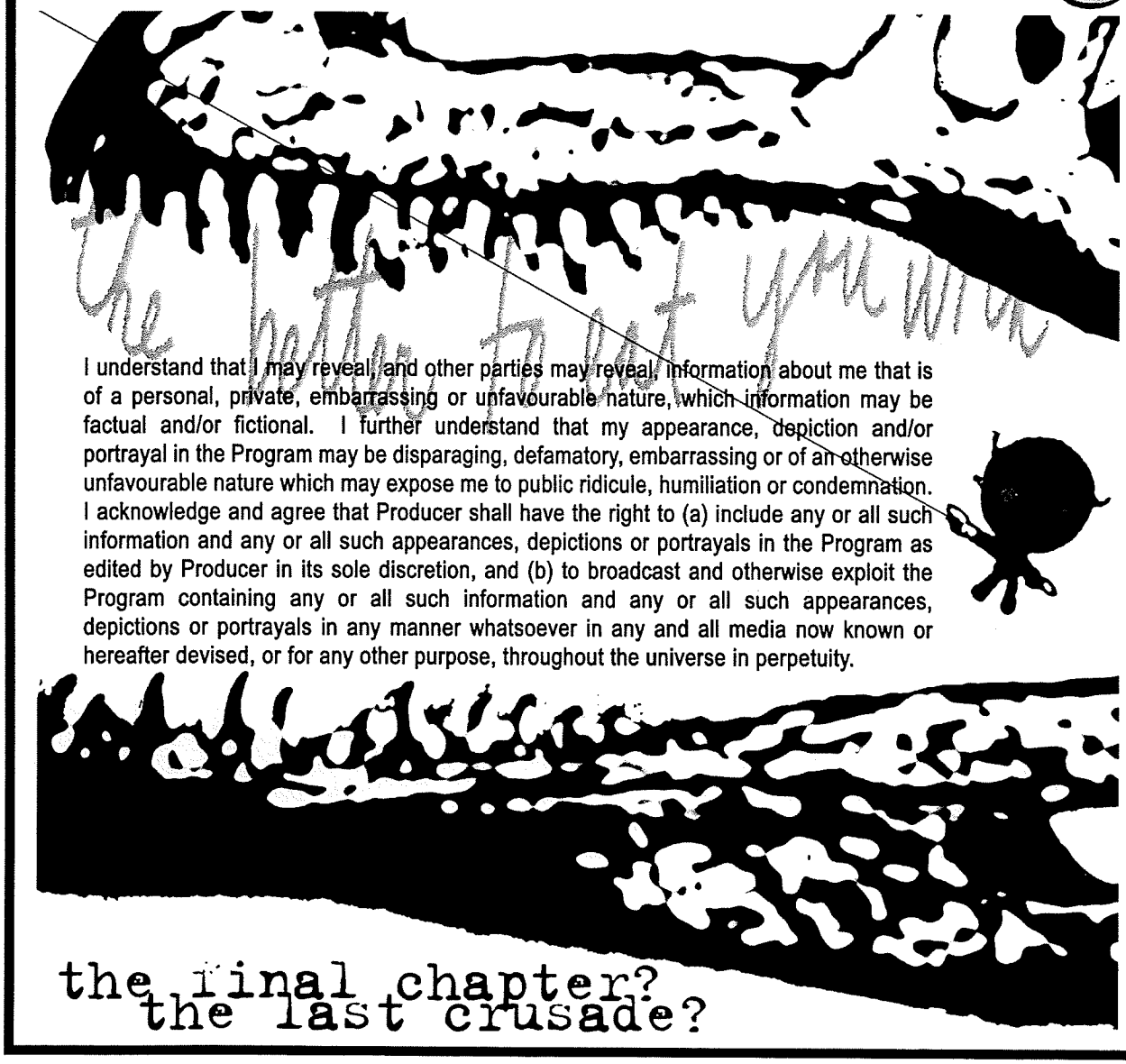
— *Staff*

. . .And the most recent of these opportunities came in the form of an article in the paper a couple weekends ago. At first I wasn't considering attending the audition, but it relates back to the notion of stepping outside my zone of comfort and pushing beyond my own ideas of limitations. Although the project did not fit the exact criteria of the show, it turned out to be a positive experience and I received good feedback and commendation.

sWell has the potential to be used at both a national and international scale for crisis situations where there is a need for clean drinking water. As opposed to products that fulfill only one function, sWell has additional applications that include; use at a cottage where the lake (drinking) water is compromised, in recreational waterways, as well as uses for livestock. sWell will be successful because it fills a fundamental need for clean water, solves a problem for disaster relief, is technically feasible to produce and it is a differentiated product based on what the competition offers. The sWell is very different from other filtration products on the market because of its ability to be rapidly deployed in a disaster area. Unlike other filtration technologies that must be trucked in to the area, sWell can be dropped into the area via plane if required.

Other products also need to be on land near the source of the water while the sWell actually floats in the water and can be used as a flotation device. Some unique features of the sWell are: Rapid deployment in place of bottled water; Ability to rapidly filter flood or grey water into drinkable water; Self-sustaining unit that acts as a water storage tank and a filtration system; and the Ability to be used as a safety raft during a flood. Some of the unique program service goals for sWell include the opportunity to extend the life of the original product though a core return/recycling program and a technical training program. Customers could return portions of their sWell to be replaced, or to be reworked for future sales if possible. The customer could send in portions of their old sWell for reuse in other products or simple recycle them. A program could provide training to local peoples on the use of sWell and effective methods of rapid deployment into disaster areas. The sWell is innovative as it uses existing technology such as solar energy, filtration, pumping systems and inflatable material to form the product. There are no other products in the marketplace that exactly match the sWell.

elevator pitch



This process has enabled me to not take myself too seriously as to miss or pass by potential opportunity. While at times this can be disheartening, or even downright terrifying, being open to both criticism and praise is all part of the experience; as is learning to be critical and reflective, but not judgmental of, what you read, see and hear.

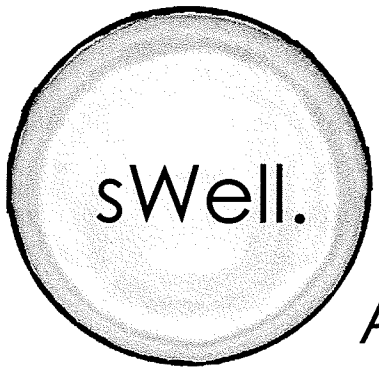
"Your SWELL system is quite unique and creative. You seem to have a very good grasp of the technology that you have employed and I am impressed with the overall layout that you have devised, without ever having worked on such a project in our industry before. We have taken on far simpler project and have taken far longer than you to bring a concept to a pre-prototype stage - I commend you for your work. It is clear that this product will be of great interest primarily to government agencies (relief and disaster control bureaus) as well as military equipment planners. I can certainly envision how this would be used as part of a wide range of relief efforts by public authorities. Waterite is very much a Canadian leader in the residential and light commercial water treatment market. This involves very little ground breaking engineering - typically our engineering would be best described as reverse engineering or application engineering, as opposed to the kind of design engineering resources that you are going to need to make SWELL fly. You will need a partner that can appoint engineers on a dedicated basis to oversee, prototype, test and market the product."

"I am not surprised that you have had a little trouble finding financial resources to help develop your SWELL project. We work in a very conservative industry and finding firms to venture into a new product like you have designed is not an easy job, for sure. Most of the companies that I know are interested in something that will provide early cash flow as opposed to al long sales cycle. I am sure that you have gotten that message by now from the people that you have spoken to...

What ever you do, **DON'T GIVE UP! Adapt, improvise, overcome.**"

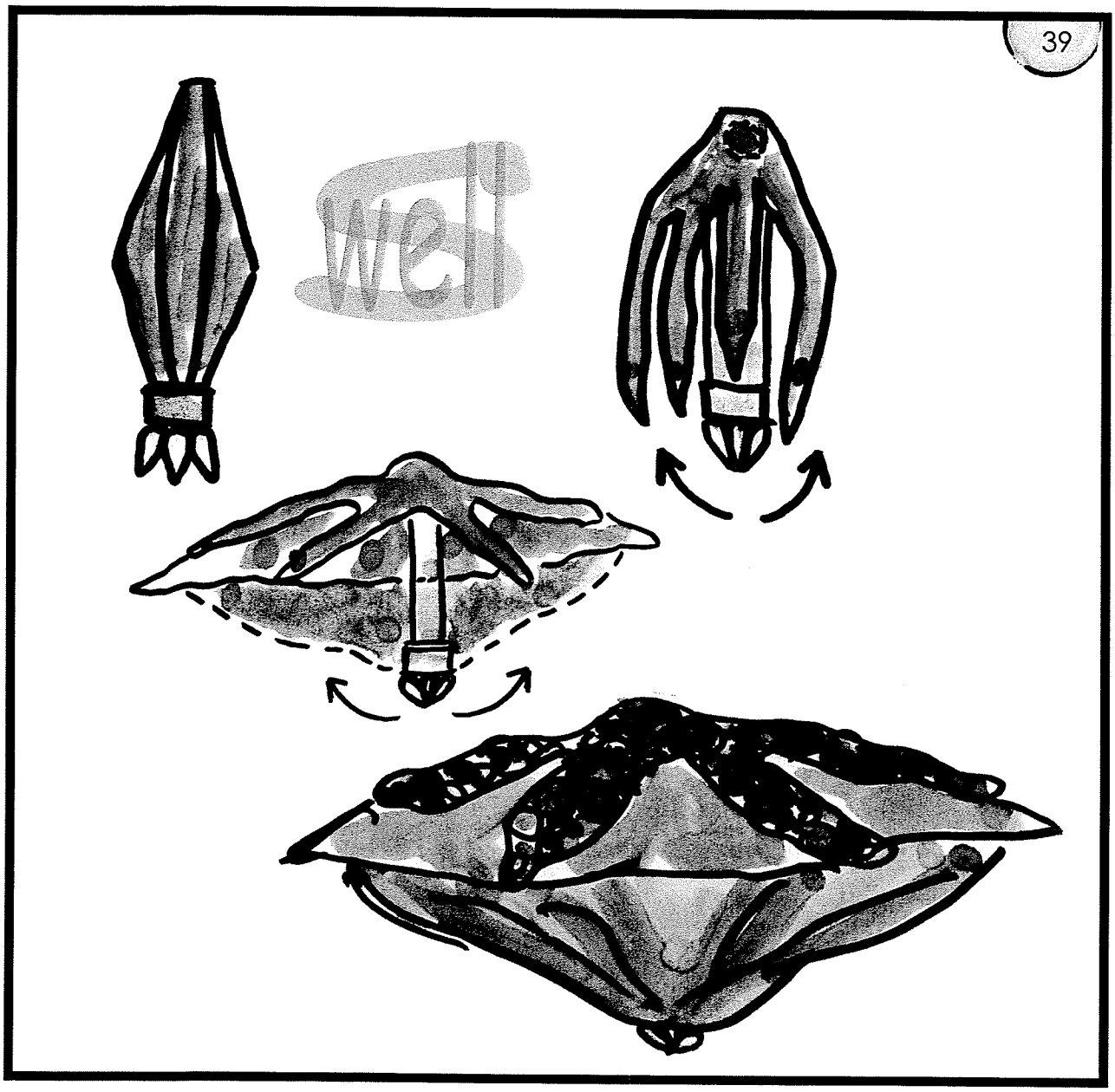
--Paul Jacuzzi, *Waterite Technologies*

I am confident that I have researched, developed and publicized the product sWell to the best of my abilities and resources available. I have received design competition awards for the concept, received media interest, acquired a patent, completed an initial market and feasibility study, and have determinedly attempted to network and contact those in the water industry that would be able to develop and test-market a prototype. As an advocate of sustainable issues, my product sWell helps to draw awareness to the numerous issues surrounding the resource of water; and while I feel I have been successful in launching the concept of sWell, I also realize that I require external expertise and capital to transform it into a reality -- the final chapter is yet unwritten. . .



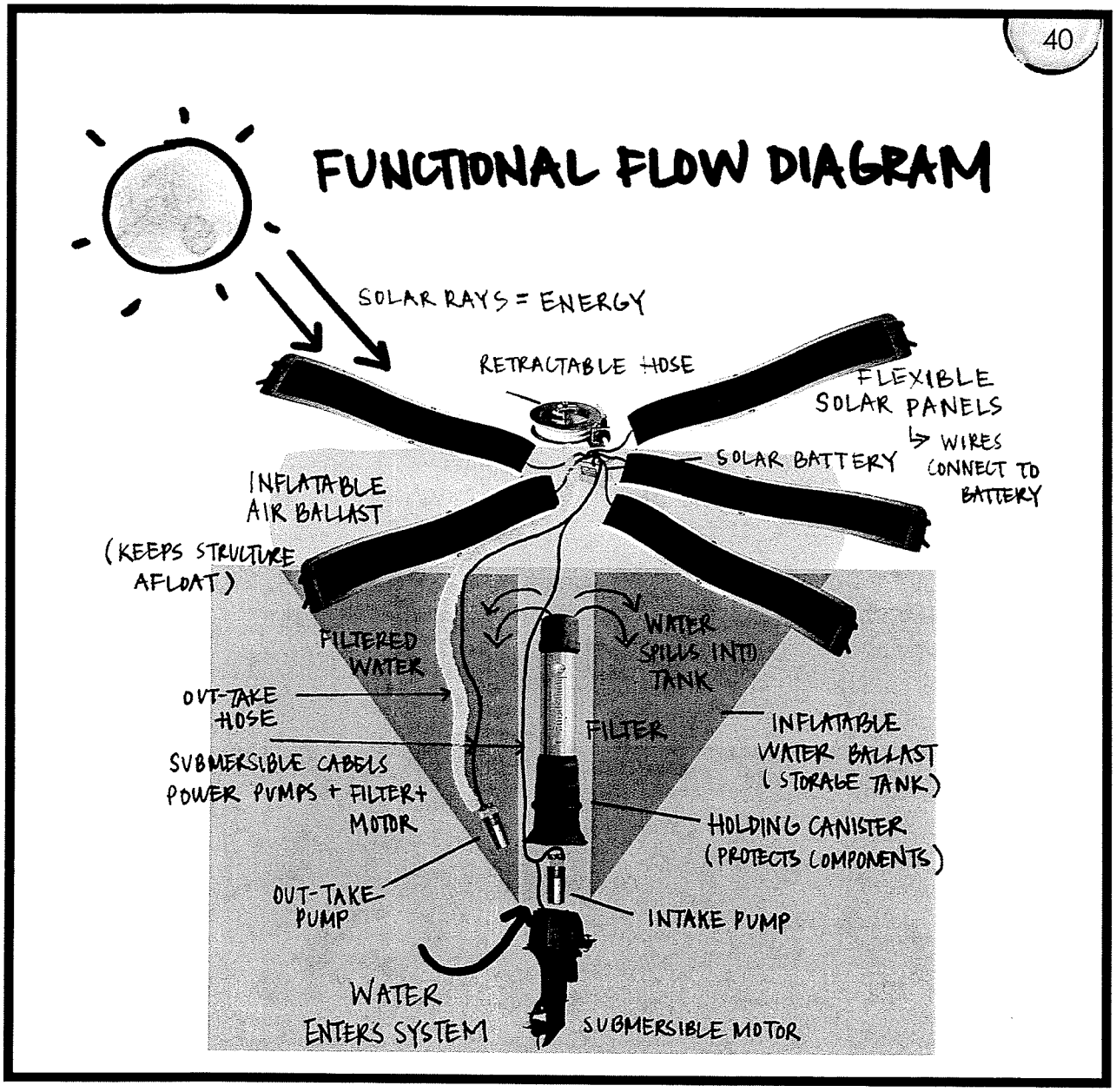
APPENDICES

studio work

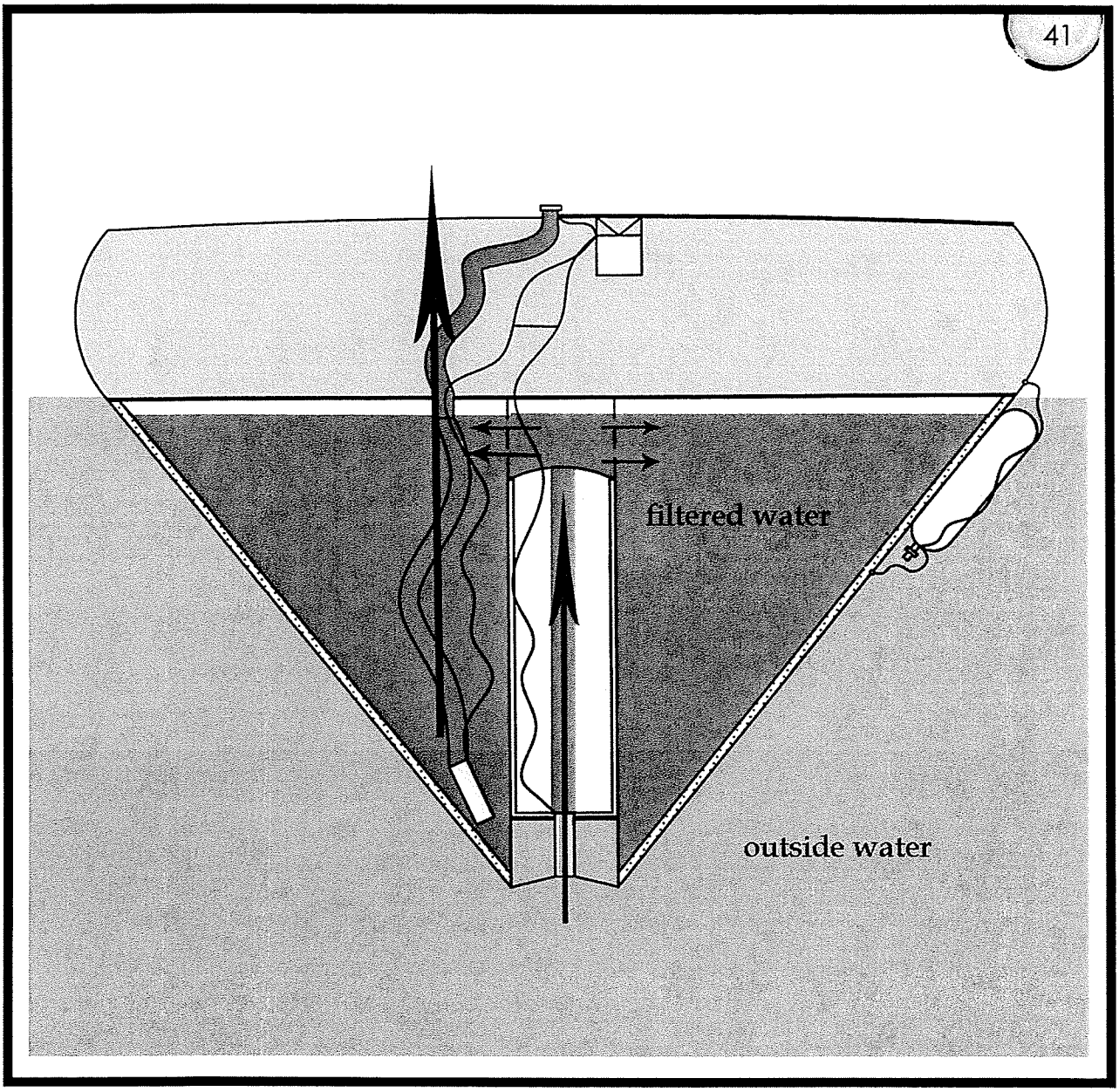


initial concept sketches of form

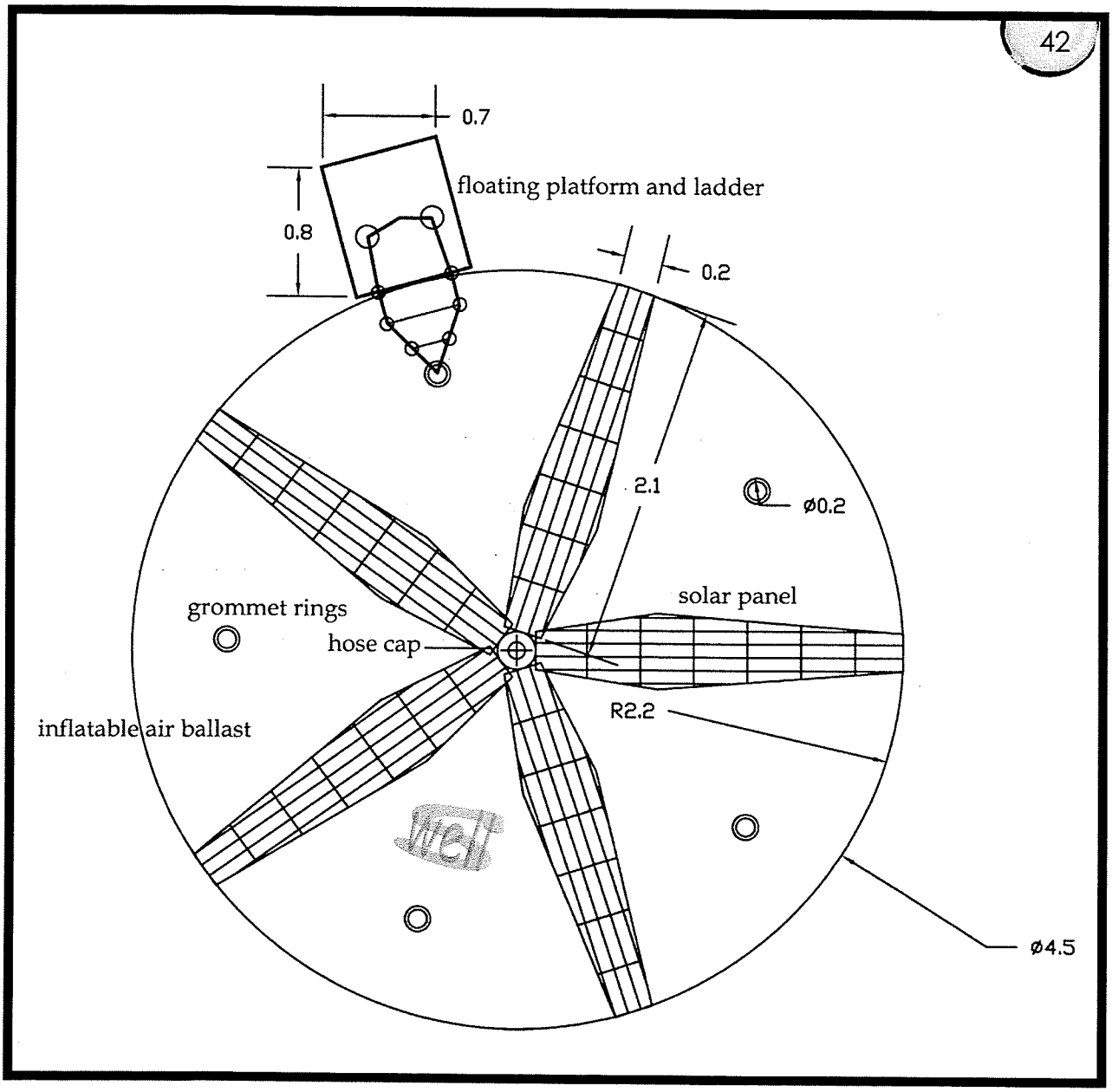
The purpose of the initial studio project was to create a self-sustaining filtration product, which filters flood water into potable water in the event of a disaster. While bottled water may at times be necessary, the production of such products has a massive ecological footprint and should be used only when absolutely essential. In times of crisis such as a flood, where there is ample water, albeit undrinkable, relief organizations have the continuous, cumbersome task of delivering millions of bottles of water, which is the number one need in all disasters.



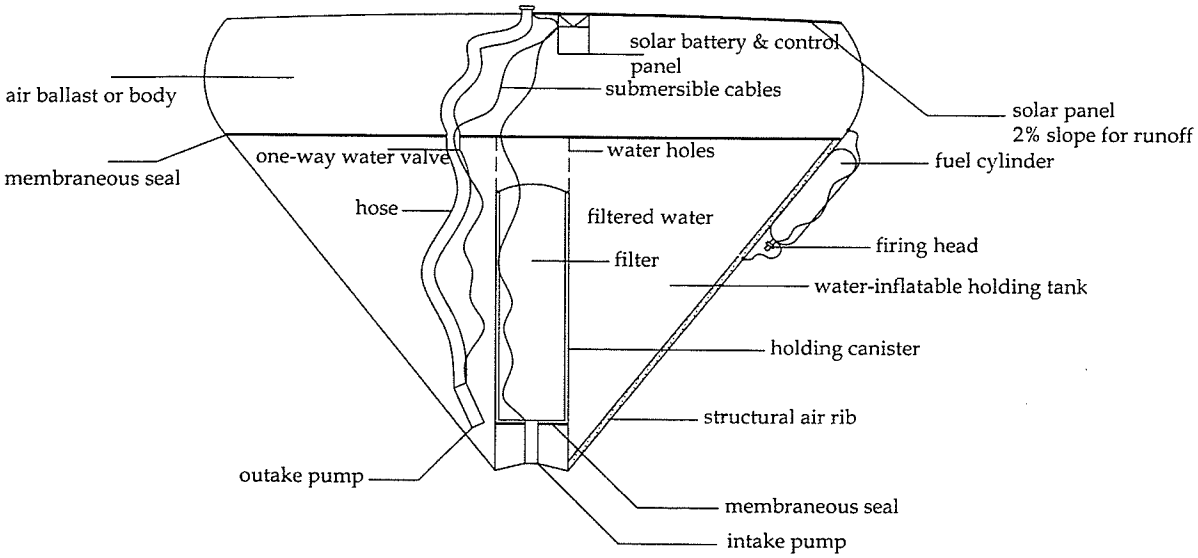
initial sketches of function



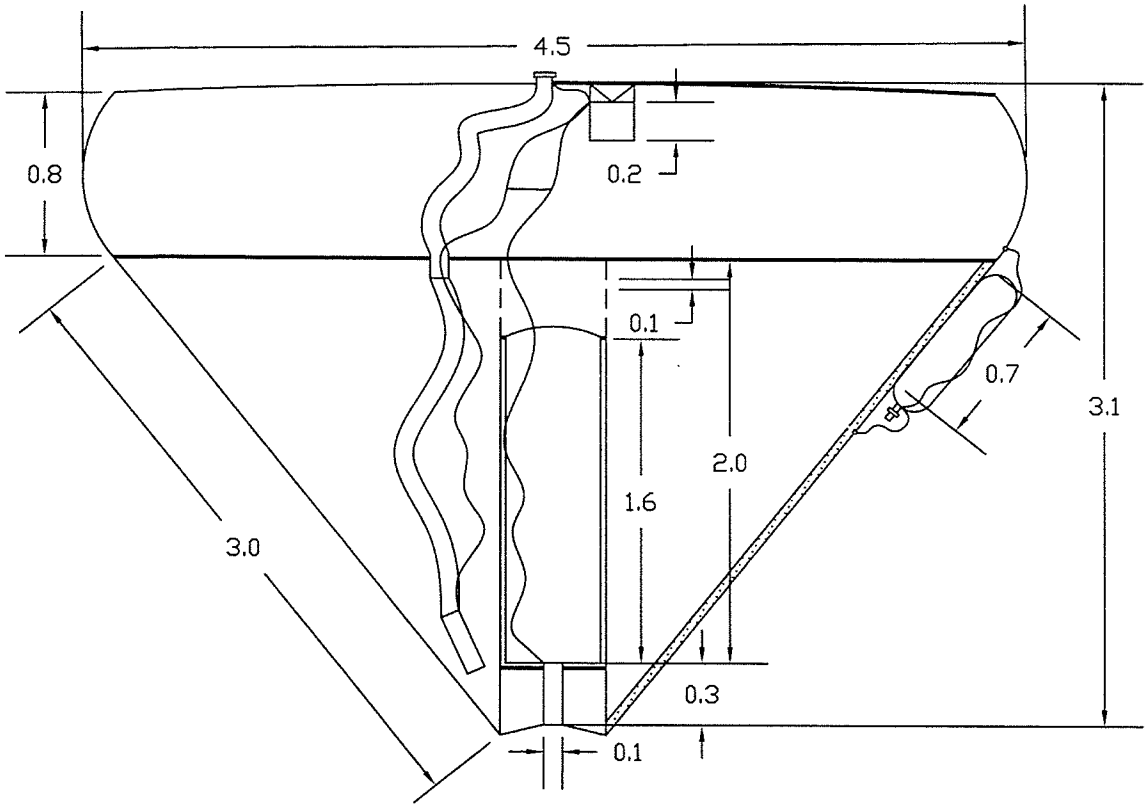
revised functional diagram - flow of water through sWell



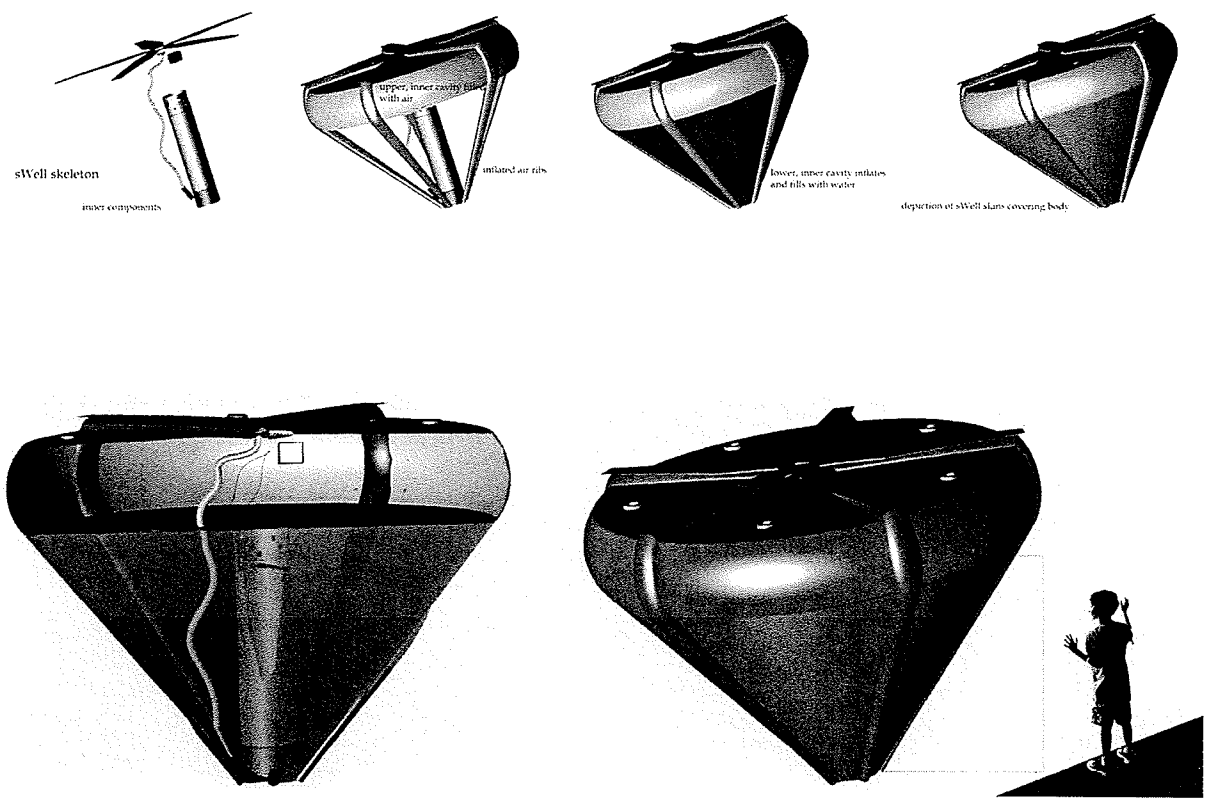
CAD plan view



CAD section - component parts

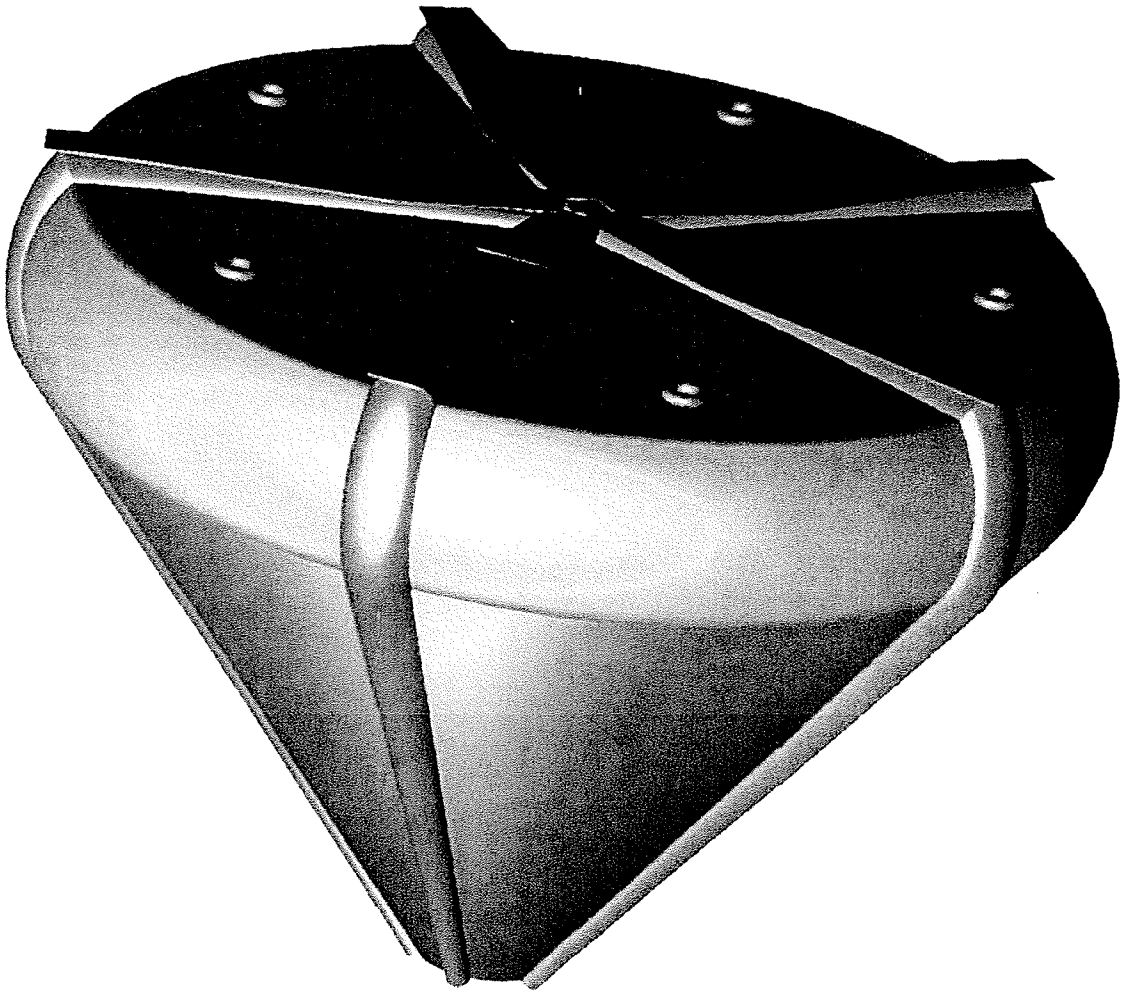


CAD section - dimensions

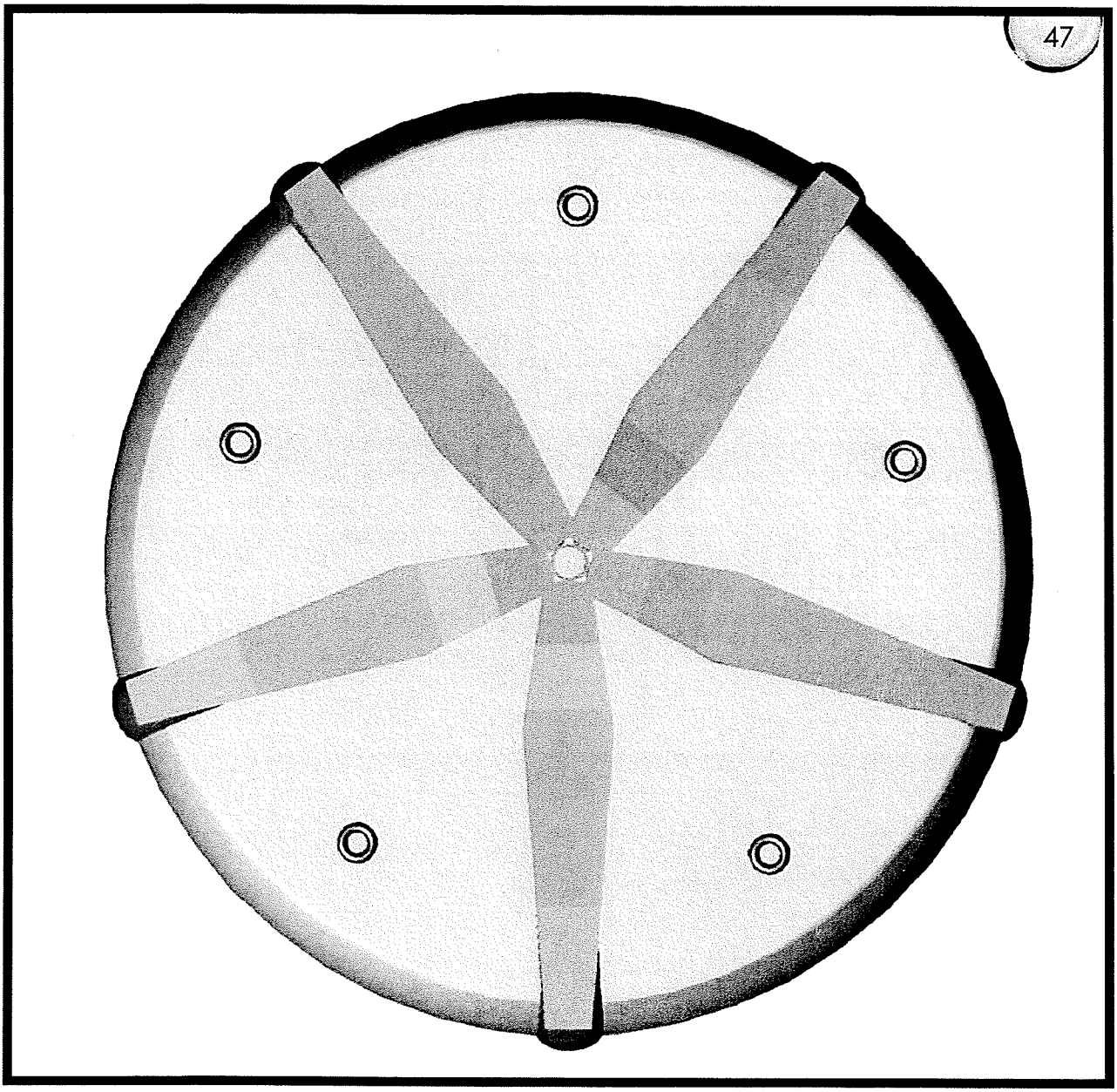


3D build-up of component parts

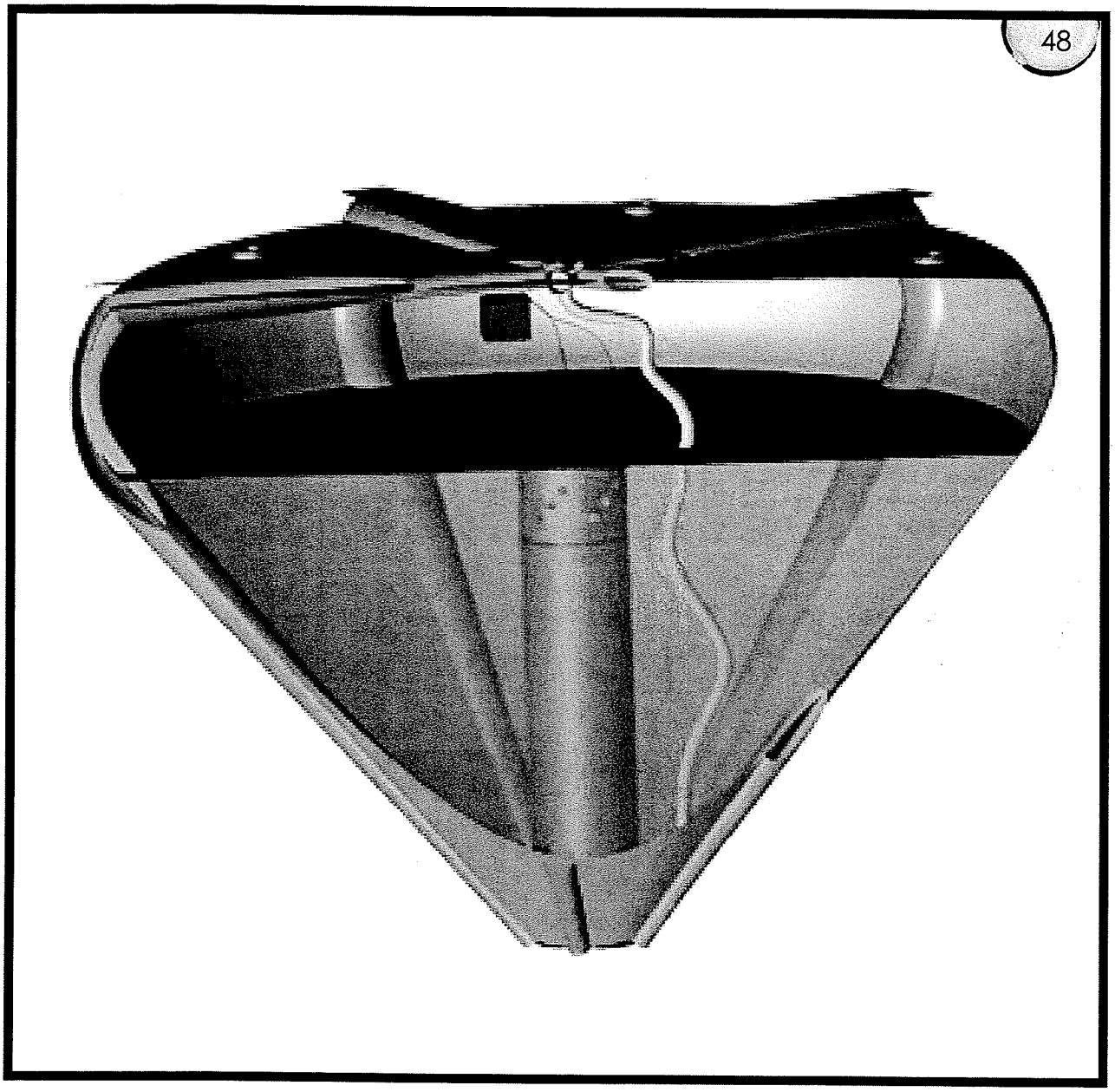
3D section



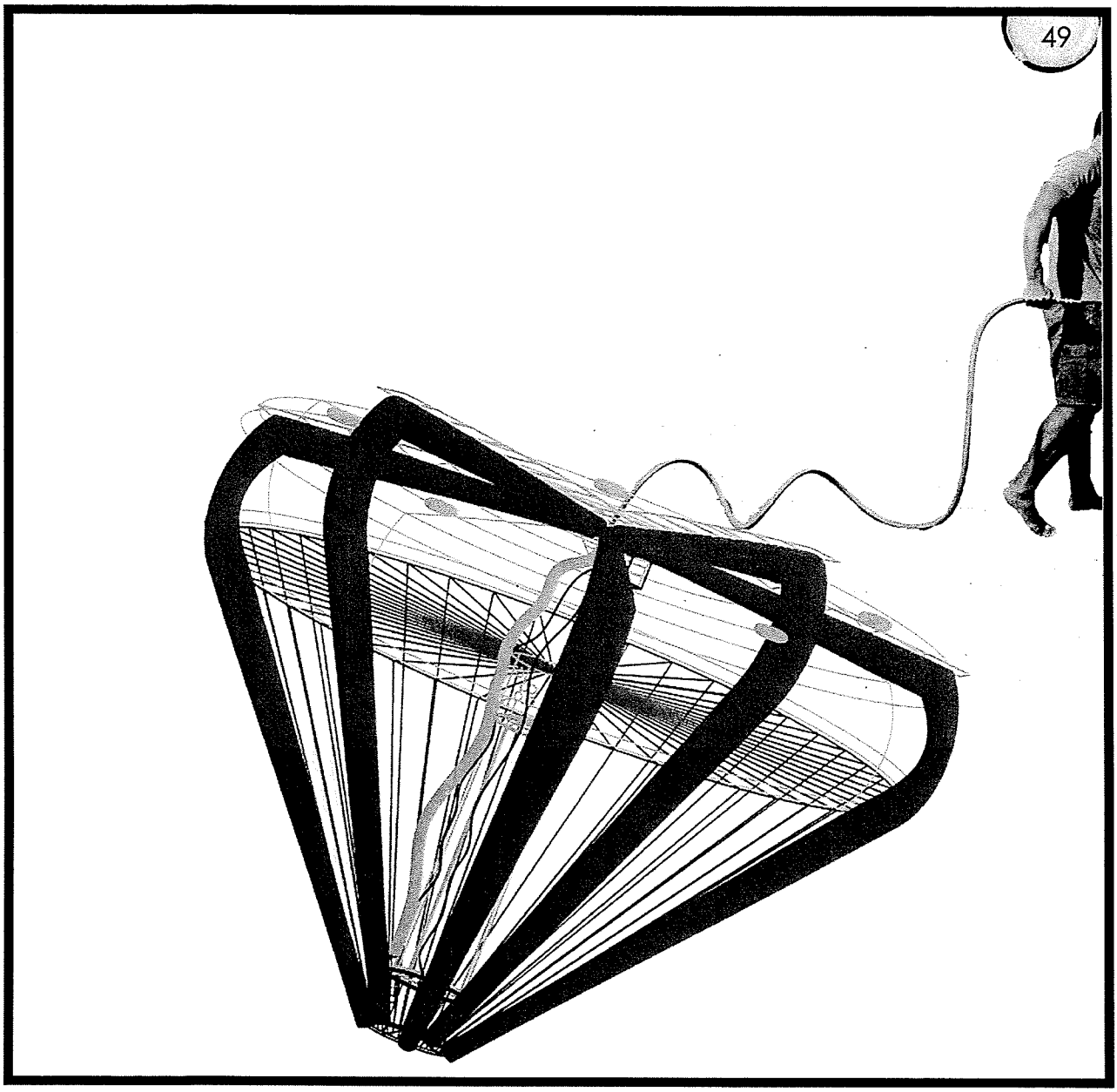
3D perspective



3D plan view



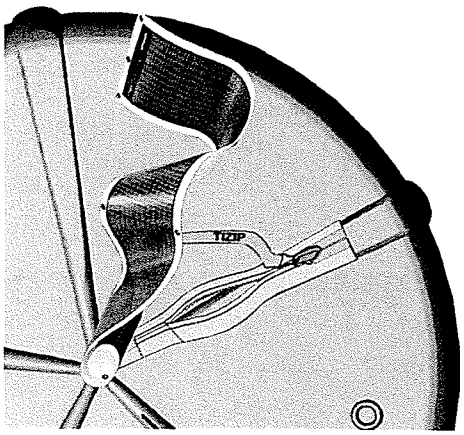
3D section



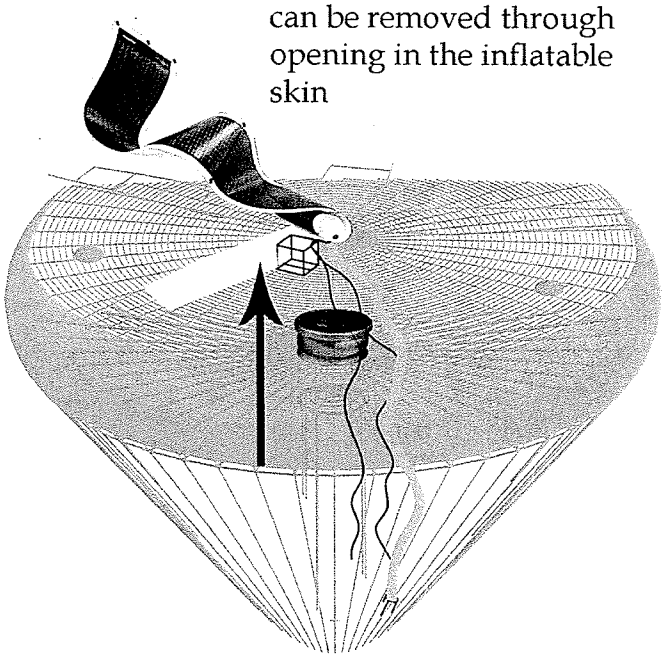
3D skeleton view

access to control panel for replacement/maintenance of component parts

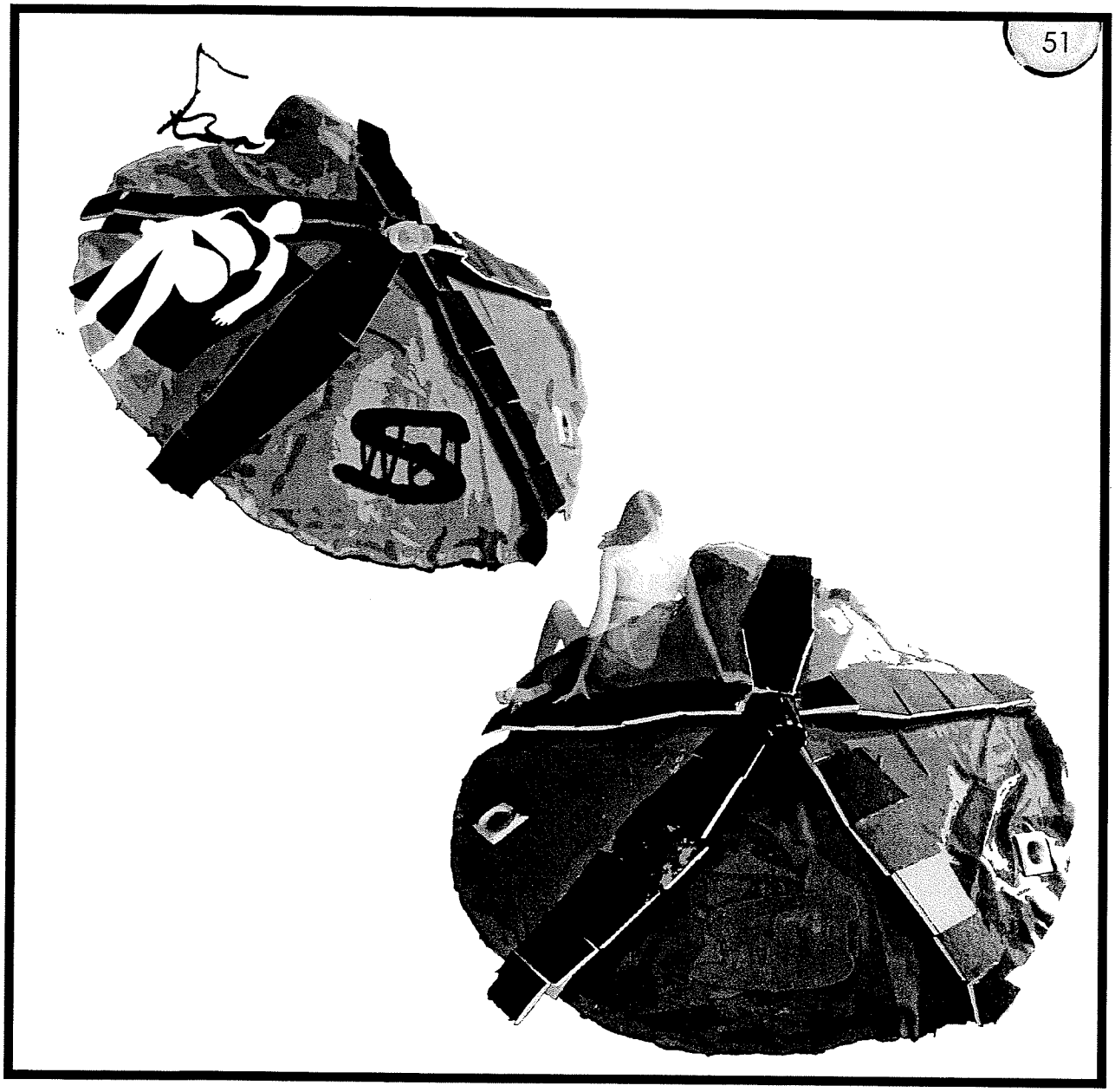
flexible solar panel folds back rubberized zipper to leak-proof container



batteries, cables and canister can be removed through opening in the inflatable skin

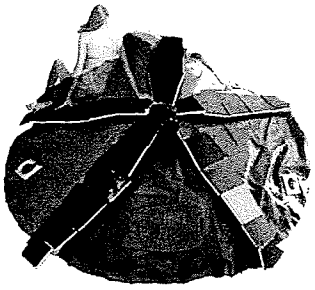


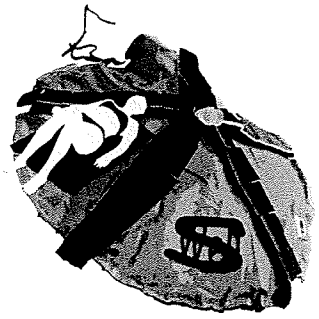
maintenance detail



study model in latex and resin

The product is a solar-powered, mobile, inflatable filtration unit titled a sWell. The form and functions of these free-roaming modules are analogous in part, to the structure and utilities of cellular eukaryotes. These units are to act as water storage tanks and filtration devices in rivers, lakes and flooded areas, both in times of flood and within homeostatic environments.





sWell skin = therma-bonded polyurethane/Duotex

1 L of water = 1 Kg, therefore holds roughly 2000 L of water (holding tank = 2 cubic m)

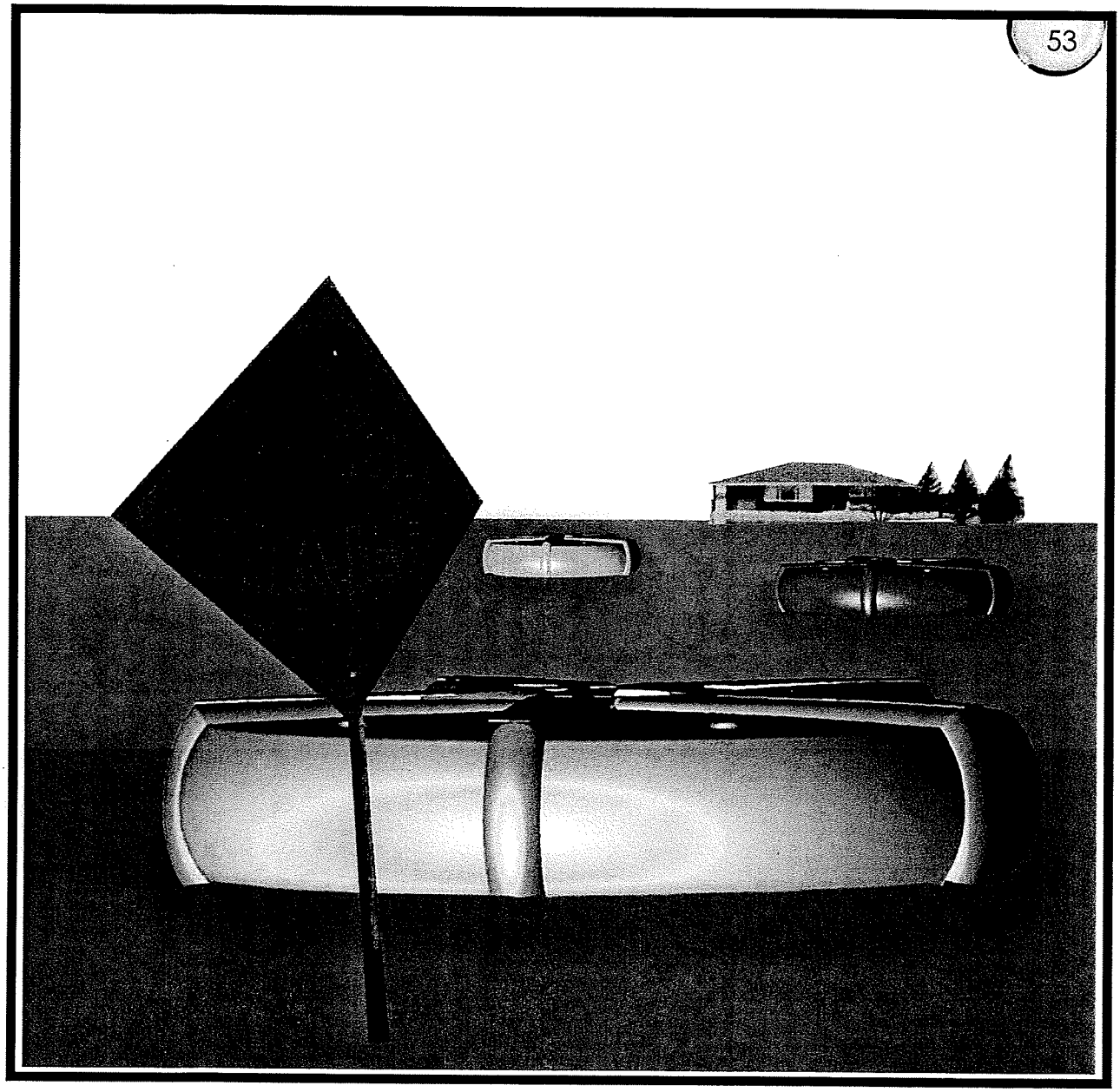
pumps and filters to full capacity in approximately 12 hrs (56Gal/hr)

solar panels generate 125 watts; solar battery life is 29.5 hrs

average household uses 375 L of water a day

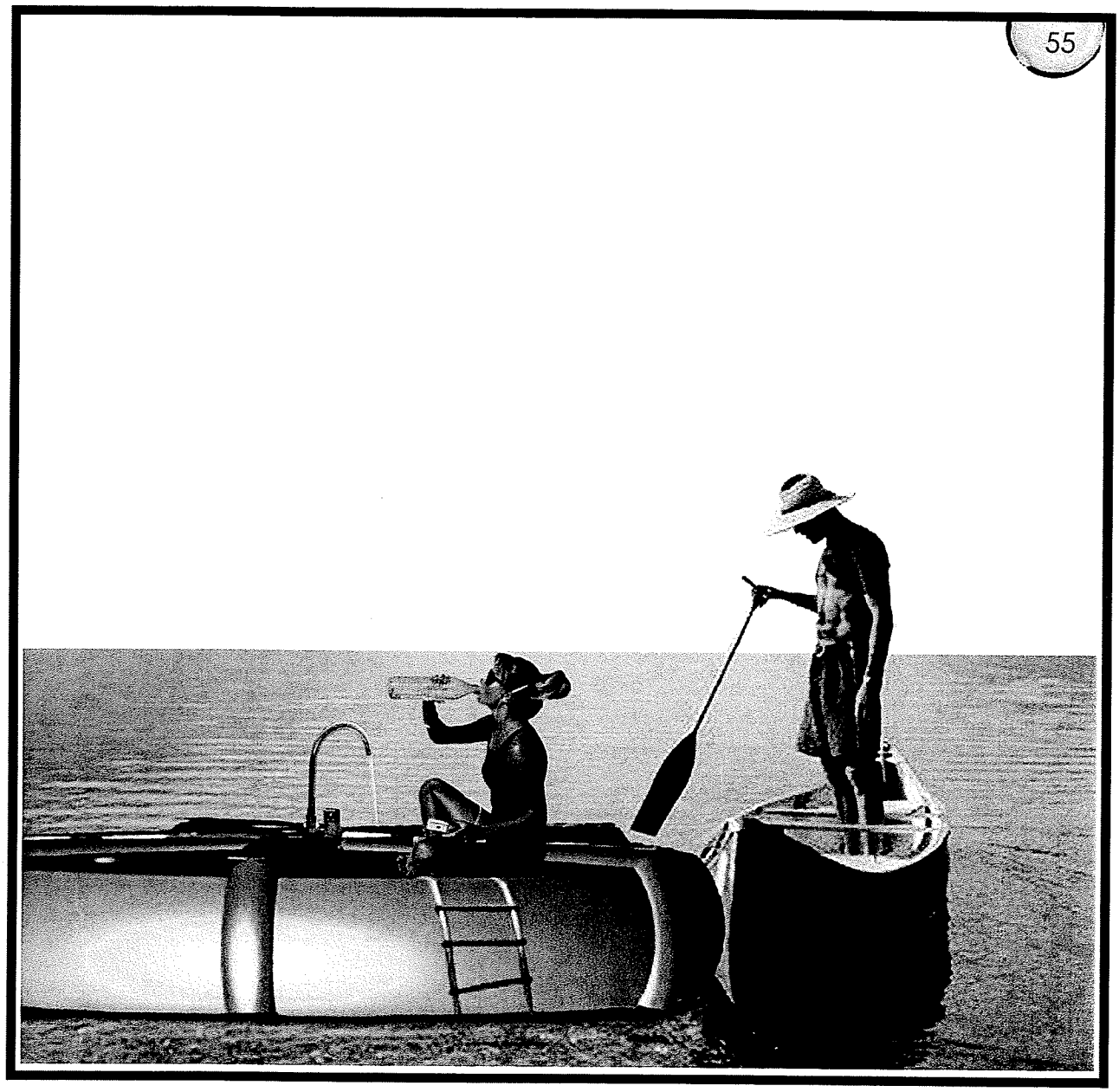
one filter cycle = 5 day, [full] water supply

sWell facts



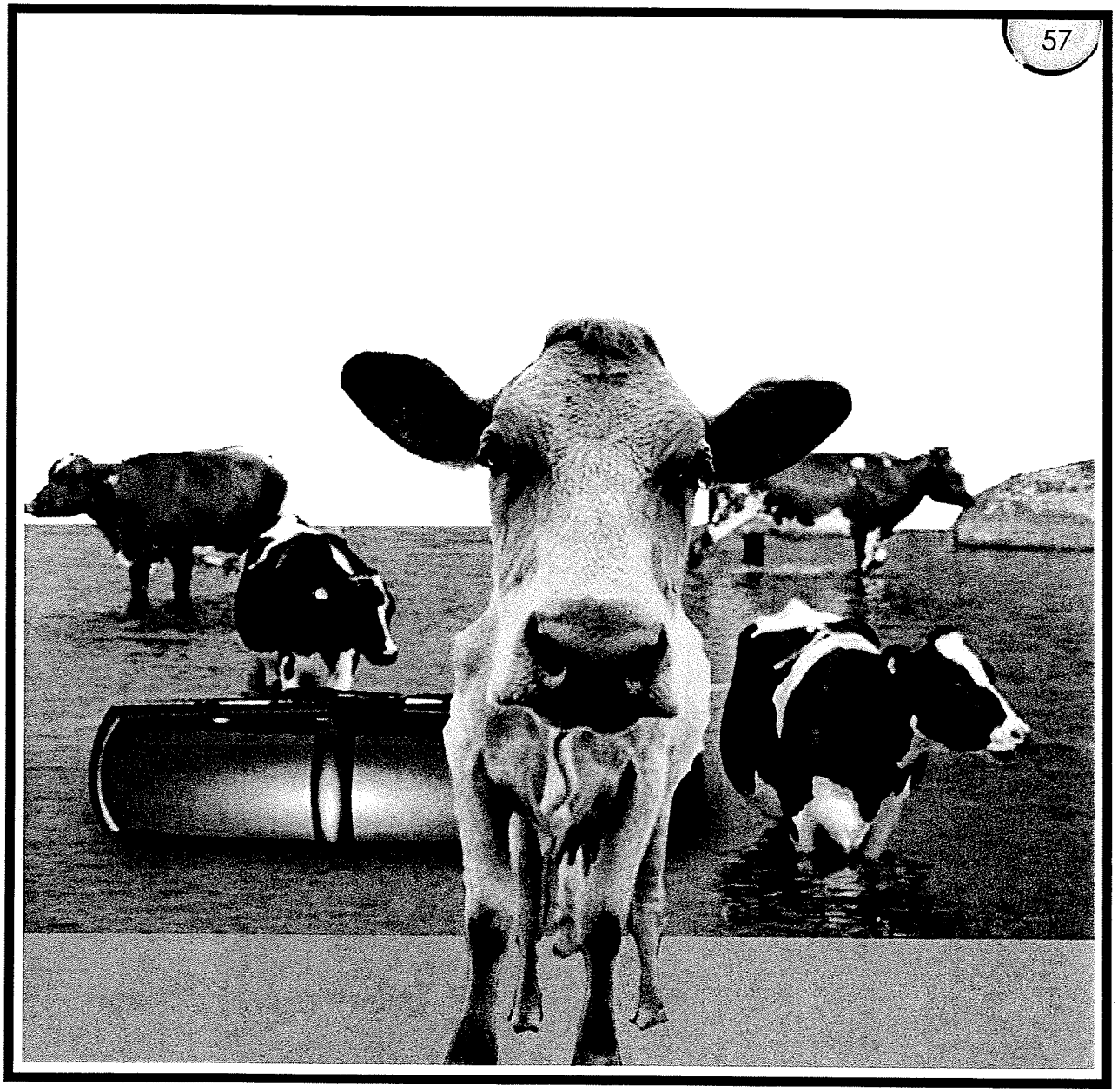
Application: Disaster Mitigation

Application: Disaster Mitigation



Application: Recreational Waterways

Application: Lake Life



Application: Livestock

sWell.

studio presentation boards

in memorable experiences

space time matter remembrance

fuse into one dimension

that penetrates the consciousness. As we identify ourselves with this space, this place, this moment, and these dimensions—they become the very ingredients of our existence and able us to place ourselves in the continuum of culture

design by reverie

This particular methodology assumes that landscapes or landscape/architectural projects are readable, hermeneutical texts: "as a human-made projection, landscape is both text and site, partly clarifying the world and our place within it. The textual landscape is thus a hermeneutical medium" (Corner, 130). It is important to clarify that the term 'readable' refers to the act of interpretation, rather than the didactic transmission of definitive fact or information. Literary theory provides the basis for this discussion in order to then apply those ideas to the practice of landscape architecture. Literary figures of speech and tropes are "terms in which people construct meaning in language, narrative and landscape. They perform the necessary function of relating one thing to another, the known with the unknown. This ability of tropes to shuttle back and forth from representations in one medium to those in another is especially relevant for transpositions between the verbal and visual, temporal and spatial, narrative and landscape" (Potteiger and Purinton, 34). These terms become a necessary means of description in all types of discourse (White, 1230). Landscape becomes a canvas that illustrates narratives: "scholars know that complex cultural information can be transmitted through story cycles...or to borrow a metaphor from the Irish writer Angela Bourke, individual stories can weave a net of belief across a landscape that is pegged down in specific places by local details" (Hill, 297).

Design through process and use of both personal and collective memories and narratives. These themes are based on experience as well as various technical and quantitative contextual data, and socio-historic research.

Design solutions and interventions are achieved through perception and experience, precise recording, reflective thinking, and creative making with water. They are recorded graphically using drawings, models, tracings, maps, photographs, montages collages, rayograms, etc...

These memories in combination with the sites' possibility for physical connection to the community, guided the design work.

How do these stories and memories manifest and spatialize themselves into physical, and tangible design solutions?

How do they assemble or realize themselves in operations, how does one bring out the combination of story and memory into space?

There is no one unifying prescription, or formula.

Narratives are also there in landscapes. They intersect with sites, accumulate as layers of history, organize sequences, and inhere in the materials and processes of the landscape. In various ways, stories 'take place.' Landscape not only serves as a background for setting stories, but is itself a changing, eventful figure and process.

Designs can still be fairly explicit in communicating their intentions but do not have to be overly wrought with forced significance. The debate as to whether or not landscape architects/architects should, or are able to embed meaning in design is continually critiqued: "significance, I believe is not a designer's construct that benignly accompanies completion of instruction. It is not the product of the maker, but is, instead, created by the receivers. Like a patina, significance is acquired only with time. And like a patina, it emerges only if the conditions are right" (Treib, 101). However, some of these 'right conditions', are the designer's ability to successfully impart, or 'set' the stage or story so to speak, for the reader. Receivers/readers, or users of the space make their own significance, or personal translation in response to the site, recognizing, consciously or not, similar themes or stimuli, that relate directly to both the personal and to the collective. Not explicit, literal narratives, but rather subtle abstractions that communicate a variety of subject matter. In his book title, The Bush Garden, Northrop Frye describes literature as a "conscious mythology: it creates an autonomous world that gives us an imaginative perspective on the actual one" (Frye, 235). Design, like literature follows a similar conduit. Through the creation of space, both conscious and unconscious inferences percolate, encouraging the user to extract individual significance and imaginative perspective.

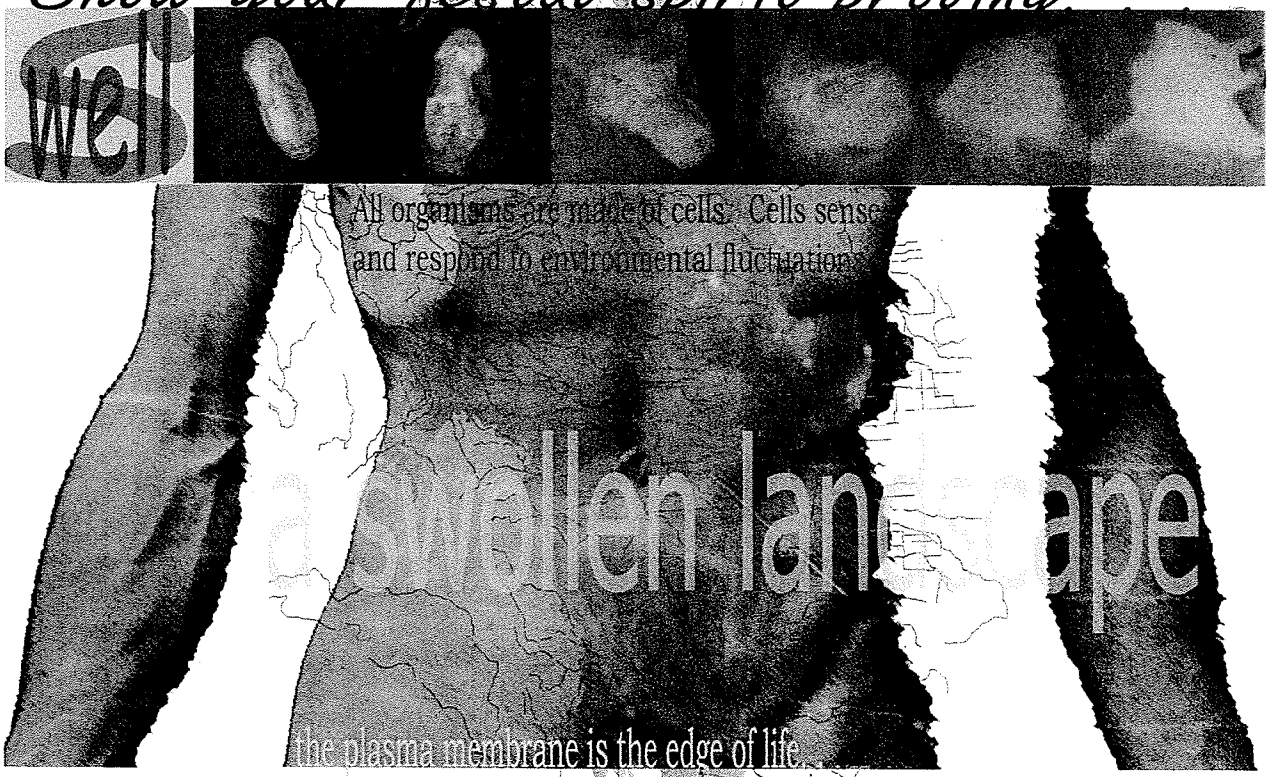
premise Architecture is both dream and function. It is an expression of utopia and instrument of convenience. It mediates between mental and physical realities to inspire us both spiritually and empirically

purpose To explore the relationship between oneiric (relating to, or suggestive of dreams) and material phenomena in the making of architecture, through the examination of water in urban life by re-considering the structures, presence, and memory of water

medium Water. Water—like fire, earth, and air—is an element in a pre-Socratic sense and therefore embodies both realities. So too is water composed of stories, beyond its molecular fusion of hydrogen and oxygen

goal To acknowledge, celebrate and utilize water to enhance the quality of community life and embellish the collective memory of place. To make water visible to the city, to use water to as an essential role in the making of a poetic city that stimulates and relates to us as human beings

Float in life that's sorrow free;
Yet your throngs, in splendor moving,
Show your festal spirit proving.

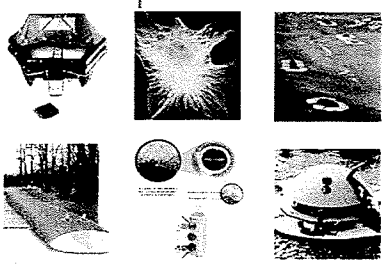


we are water

For most of us, design is invisible. Until it fails. . . Accidents, disasters, crises. When systems fail we become temporarily conscious of the extraordinary force and power of design, and the effects that it generates. Every accident provides a brief moment of [illegible] real life that is studied, analyzed, and [illegible]

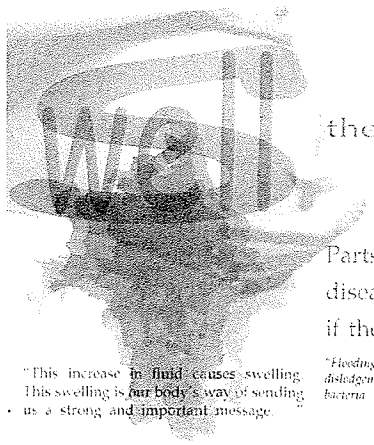
[illegible] doubling every 20 years, more than twice the rate of human population growth. If current trends persist, by 2025 the demand for fresh water is expected to rise to 56% above the amount that is currently available.

basis
intentions
program
precedent



PROMOTE the advancement of flood architecture and filtration/membrane technologies.
INCREASE awareness of, and respond to regional, national and global water issues; the social, political and the ecological.
EXPLORE and REVEAL the intrinsic relationship between design/imaginative perspective and science.
PROVIDE an additional source of re-usable or potable water.

The purpose is to design mobile, inflatable filtration units within the context of a 'swollen landscape', or the *Red River Basin*. The outcome is product design that is to be part of a larger infrastructure or water filtration and storage network. Although nomadic in character, the *sWell's* serve as permanent fixtures within the landscape and are to be operated by a centralized nucleus, or control depot for maintenance and delivery of water. The form and functions of these free-roaming modules will be analogous in part, to the structure and utilities of cellular eukaryotes. These units are to act as water storage tanks and filtration devices in rivers, lakes and flooded areas, both in times of flood and within homeostatic environments.

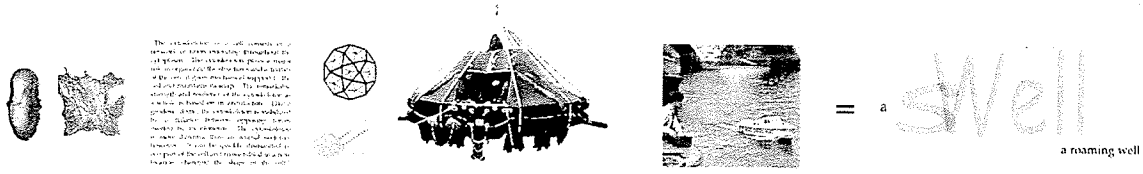


"This increase in fluid causes swelling. This swelling is our body's way of sending us a strong and important message."

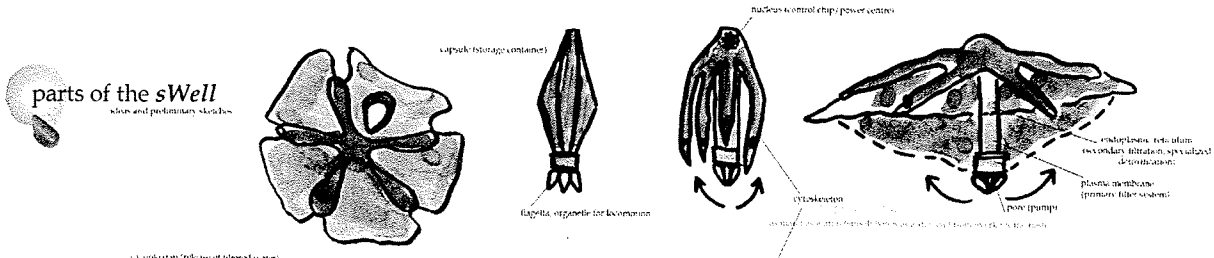
the undulating movement of the surface of the open sea

Parts of the body [landscape] may swell in response to injury [flood], infection or disease [waterborne parasites, viruses, and bacteria] Swelling can also occur if the body is not circulating fluid well [poor flood design and management]

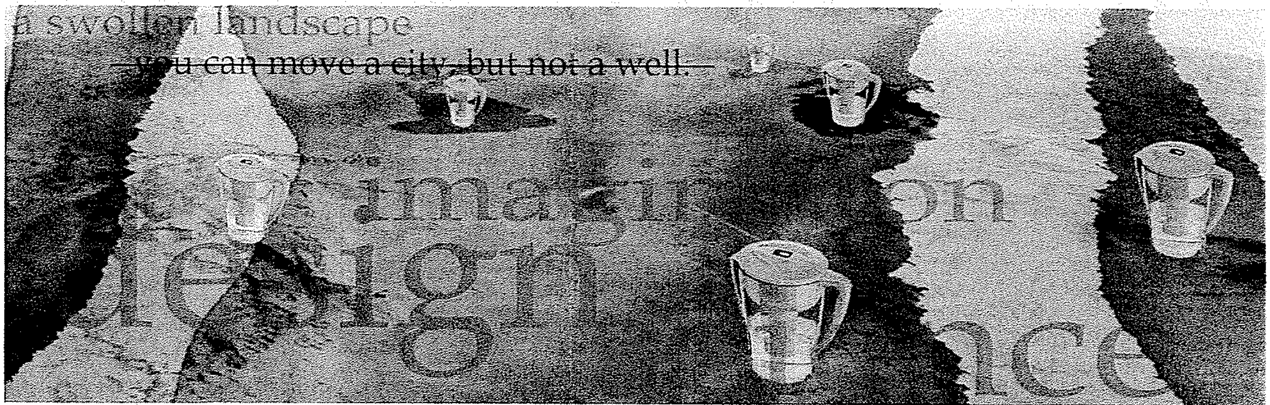
"Flooding can cause the disruption of water purification and sewage disposal systems, overflowing of toxic waste sites, and dislodgement of chemicals previously stored above ground. Floodwater often contains infectious organisms including intestinal bacteria such as E. coli, Salmonella, and Shigella; Hepatitis A Virus; and agents of typhoid, paratyphoid and tetanus."



a traumatic injury of the soft tissues, manifested in the skin [land] from a breakage [flood] of the local capillaries [water bodies]. Which results in the leakage of cells [*sWells*]. Swelling fades as the body metabolizes [purifies] the cells of the skin [land]...



When the well is dry, we learn the worth of water.



1 L of water = 1 Kg, therefore holds roughly 2000 L of water (holding tank = 2 cubic m)

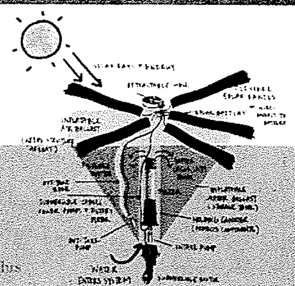
sWell skin = therma-bonded polyurethane/Duotex (zodiac®)

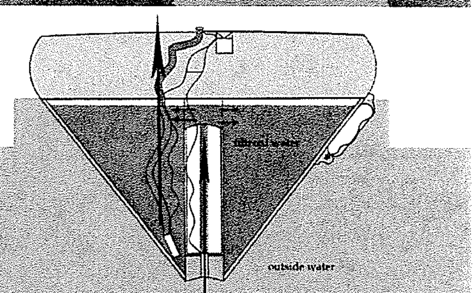
total weight of sWell at full capacity = 2100 kg

pumps and filters to full capacity in approximately 12 hrs (56Gal/hr)

2.5 sq.m of solar panels generate 125 watts; solar battery life is 29.5 hrs

*average household uses 375 L of water a day

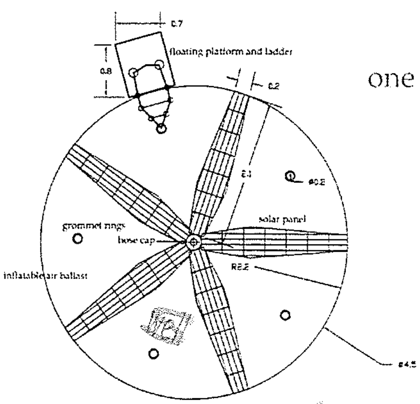


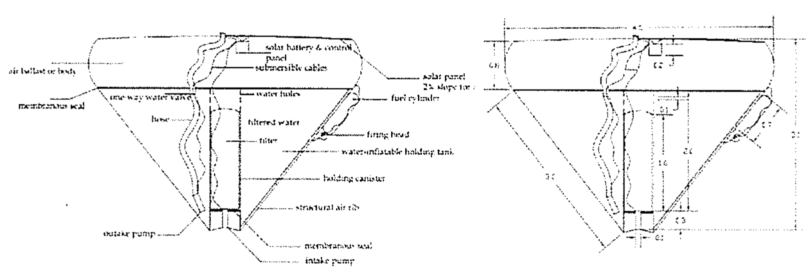


function

water flow

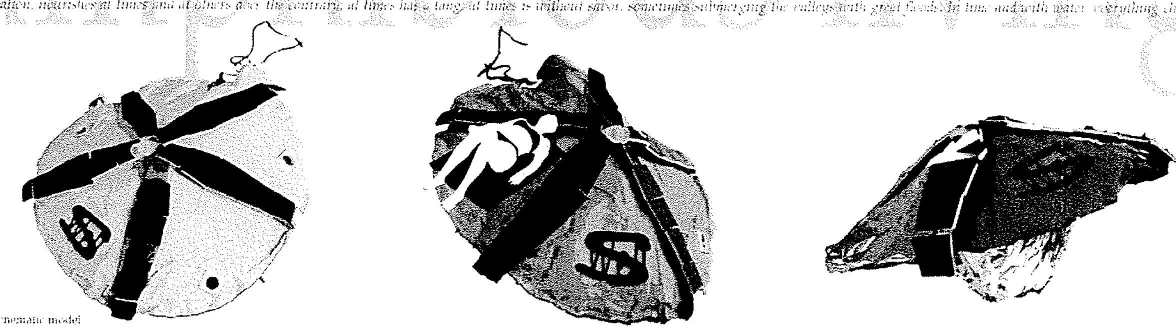
one filter cycle = 5 day, [full] water supply





plan & sections

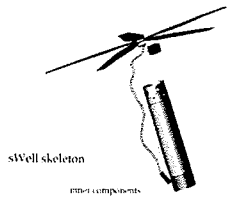
Water is sometimes sharp and sometimes strong, sometimes acid and sometimes bitter, sometimes sweet and sometimes thick or thin, sometimes it is seen bringing hurt or pestilence, sometime health-giving, sometimes poisonous. It suffers change into as many natures as are the different places through which it passes. And as the mirror changes with the colour of its subject, so it alters with the nature of the place, becoming noisome, laxative, astringent, sulfurous, salty, incarnadined, mournful, raging, angry, red, yellow, green, black, blue, greasy, fat or slim. Sometimes it starts a conflagration, sometimes it extinguishes one; is warm and is cold, carries away or sets down, hollows out or builds up, tears or establishes, fills or empties, raises itself or burrows down, speeds or is still; is the cause at times of life or death, or increase or privation, nourishes at times and at others does the contrary, at times has a tang, at times is without savor, sometimes submerging the valleys with great floods. In time and with water, everything changes.

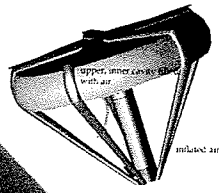


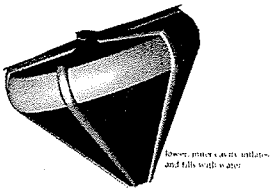
schematic model

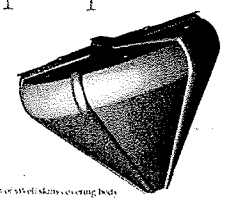
sWells in space

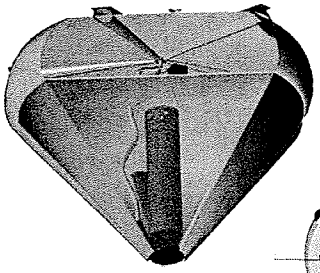
views and perspectives

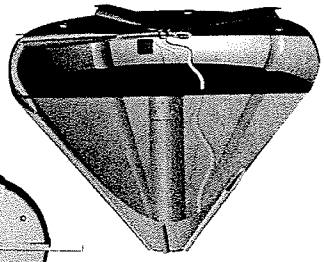




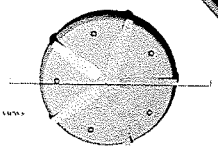


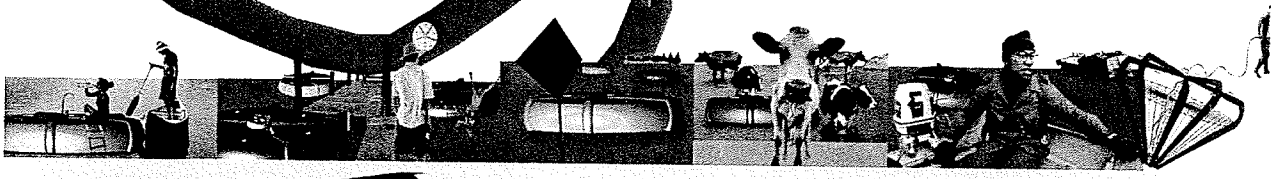


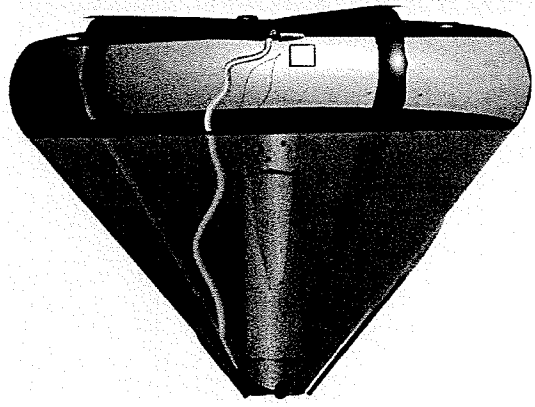


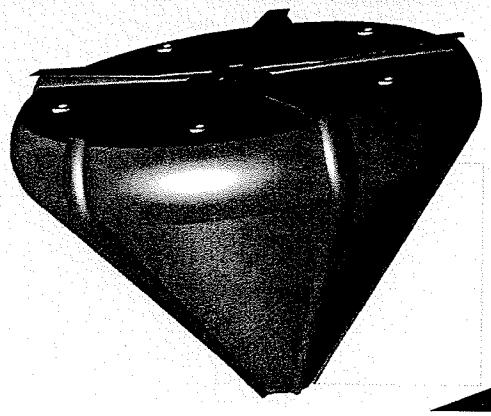


applications









sWell.

competitions & awards

"Shahneshin Foundation (SF)"
11/15/06
SF announcement

Erman Ardaman, Zeynep Aygen, Rami Bishara, M. Emran Hossain, J. Kitchai, A. Legoo, Boris Ljubicic, A. Can Metin, H. Pallop, J. Peel, Alina Prokopchuk, Andrea Wilkinson, and S. Zandy, have been selected from a highly-regarded worldwide practices and institutions in the Shrinkage Worldwide Awards 2006 to design a multi-purpose poster capable of delivering the shrinkage nature.

The jury's selections will be showcased as a public exhibition scheduled to open at the Seeschau Pavilion in Zurich, December 2006. In addition, the show will be hosted at the arts and design institutions and organization, and galleries throughout the world during 2007.

Over 70 individuals and teams registered for the SWA 2006 competition and ultimately the SF received 56 submissions from nations all over the globe (Australia, China, Croatia, Finland, France, Germany, Japan, India, Indonesia, Iran, Italy, Lebanon, Mexico, New Zealand, Russia, Singapore, South Korea, Sweden, Thailand, Turkey, England, UAE, Ukraine, USA), and from an array of diverse fields -both academics and practitioners- in arts, architecture, graphic design, industrial design, landscape-architecture, planning, product-design, publicity, and robotics.

Commenting on the posters, the President of the Jury, Prof. Dr. Christoph Eggenberger, said, "What I seem to perceive these SWA-Jury-days, – are Artist with a rather shallow understanding of what the contents of shrinkage – formulate and physically itself should express."

The SF wants to thank all the participants for their effort in going along with us in building the foundation of the future; this were not taking place without the wonderful people around the globe, for their letter of encouragements, supports, and promoting the event on their web- and magazine-pages, and so-forth.

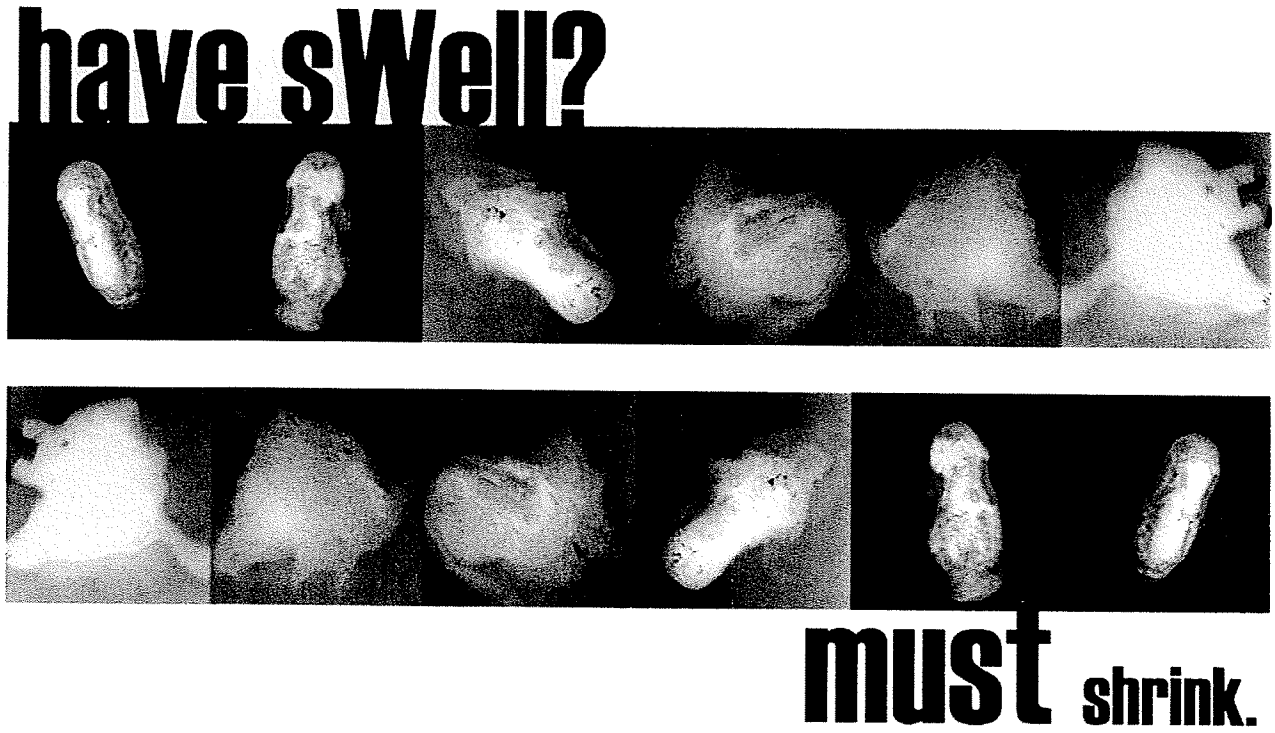
The mentioned people are invited to send their full name and permanent postal address via contact form at the SF website. Please select the type: swa 2006

Best wishes,
the SF _ Award Secretariat

http://www.shahneshinfoundation.org/contact/index.html
Shahneshin Foundation (SF)
Awards Secretariat
P.O.B. 1211
CH-8700 Küsnacht-Zürich
Switzerland
Tel: +41 (0)43 540 00 26
Fax: +41 (0)43 540 00 27

worldwide shrinkage awards 2006

This poster explores the notions of 'swelling' as the binary opposition to 'shrinkage'. The initial concept is based on biomimicry, or the use of 'natural' or biological systems to help inform design decisions, attempting to reveal the intrinsic relationship among design, imaginative perspective, and science. The embryonic-like images are derived from personal photos of 'growing' capsules that swell into sponge or foam creatures when placed in water—an 'artificial' material, product or system budding and evolving within an 'organic' one. A prosperous, mutually beneficial relationship and marriage between technical and biological systems is crucial to the forward movement of the 'second renaissance'; pressing beyond the notions and principles surrounding sustainability by the adoption of eco-effective principles and strategies rather than mere eco-efficient ones. The presence of water articulates both its life and death causing properties as well as its ever-increasing commoditization. The series of images swell, and then reverse, shrinking back within themselves, thus promoting a cradle-to-cradle design approach: "A system of nutrient flow and metabolism, in which the very concept of waste does not exist...it means that the valuable nutrients [technical and biological] contained in the materials, shape and determine the design: form follows evolution, not just function," thereby seeking their own "regenerative abundance." (McDonough & Braungart).



Greetings,

This year's response to the Tasmeem Student Project – Your Response Ability - was impressive. We had over 70 entries in total from all over the world, including the United States, Canada, Germany, Lebanon, Jordan, Kuwait and Zimbabwe.
All the entries were superior in their quality and it was a difficult decision to pick the top five.

The top five entries (in no particular order) are:

- Water is... by Holly Murdock & Hayley Neil, Utah State University – Utah, United States
Instructor: Darrin Brooks
- Rami Bishara & Hilda Moucharrafieh, American University of Science and Technology - Beirut Lebanon
Instructor: Rania Bechara
- sWell by Alaina Prokopchuk, University of Manitoba – Winnipeg, Canada
Instructors: Prof. Eduard Epp, Dr. Richard Perron
- Hope Jordan, Virginia Commonwealth University – Virginia, United States
Instructor: Robert Meganck
- Water Systems in Urban Landscapes by Eva Nemcova & Christoph Wust, University of Hanover – Hanover Germany
Instructor: Antje Stokman

The winners of the contest will be contacted within the next couple of days to be informed of their prizes.
All the entries will be displayed during the conference and there will be a publication that will be produced from all the student project entries which will then be distributed to the schools.
I'd like to take this opportunity to thank all of you for your remarkable efforts and participation in Tasmeem Doha 2007's student project.

Kind Regards

Donna Duffett
Events Project Manager
VCUQ School of the Arts in Qatar

TASMEEM DOHA 2007 STUDENT COMPETITION
"The Tasmeem Annual Design Conference in March addresses the topic of sustainability. The conference theme Sometimes, You Just Have To Do It Yourself, is based on the idea that it often takes the efforts of a single individual to bring attention to ways in which design can solve, improve, or prevent the problems created by the way we live. The 2007 Tasmeem Student Project is based on the idea that the more we value something, the more likely we are to care for and preserve it. Therefore the goal of this project is to explore the ways in which designers can express the value of water in personal, economic, political, social or aesthetic terms. Students are to propose a place, product, image, event, technology or process that addresses the selected condition and emphasizes the value of water, drawing upon one of its particular characteristics."

Water filter earns trip to Qatar
U of M student sole Canadian at conference
Fri Mar 2 2007
By Lindsey Wiebe

A University of Manitoba student's unique design for a portable water filter has earned her an invitation to an international conference in Qatar this weekend.

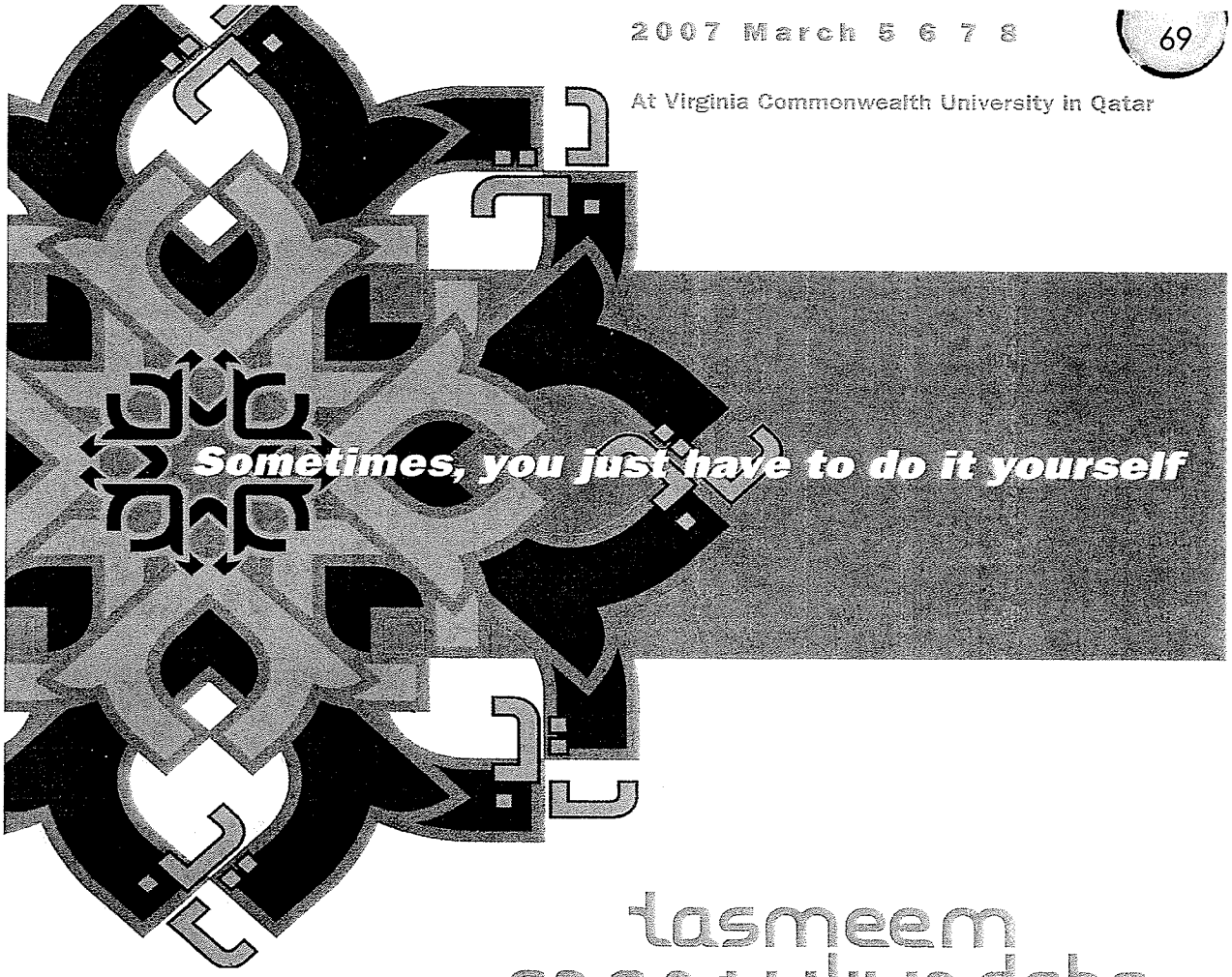
Landscape architecture student Alaina Prokopchuk is the sole Canadian among 70 international students who'll be presenting their designs at Tasmeem Doha 2007, a sustainability-focused design conference in the Middle East country featuring David Suzuki as a keynote speaker.
Prokopchuk leaves Saturday for Doha, Qatar, where she'll show her design for a portable, inflatable water filtration unit, a system that could provide fresh water for victims of tsunamis and other natural disasters.

"The issue I was concerned with, obviously, was drinking water," said the 26-year-old masters student, who came up with the idea after extensive work in her studio class.
Prokopchuk said she was frustrated that people needed to rely on bottled beverages during floods, when they were literally surrounded by water.
"it just didn't really seem to make sense to me," she said.

The project was also sparked by Prokopchuk's interest in bio-mimicry, which involves drawing inspiration from nature and translating it into design. Prokopchuk examined everything from how the body responds to bruises to how land responds to floods -- in both cases, with swelling. She also took inspiration from the foam children's toys that swell when placed in water.

Prokopchuk's floating, solar-powered invention, called a sWell, draws on some of the same principles. The top of the 4.5-metre, strawberry-shaped structure is full of air, while the filtration system and pump run through the middle. Water is drawn through the filter and fills the bottom of the structure, with the top acting as both a buoy and a raft.

In North America, the filter could be used in the event of a flood or water contamination. Prokopchuk is also studying how it could be used in Third World countries like Bangladesh, where many semi-nomadic residents live on sandbar islands called chars that routinely disappear underwater.
"The problem with these islands is, you can't develop infrastructure on them," said Prokopchuk.
Bangladesh also has one of the highest rates of death due to water viruses and parasites, another reason a portable filtration unit could be useful. Prokopchuk said she'd love to see her design picked up by a company, particularly given all the attention that's being paid lately to so-called designer water. "They're out bottling water to music and selling it for $50 a bottle... which is fine, but at least these companies should look at other water issues, and maybe some of the profits going to people who are drinking mud water, essentially, or don't even have water," she said.
lindsey.wiebe@freepress.mb.ca



Aliana Prokopchuk [BA/01]

Photo: Ian McCausland

TO QATAR AND BACK, ON A RAFT

Graduate student **Alaina Prokopchuk** had no idea her design for an inflatable water filter device – which could potentially save thousands of lives in tsunami-ravaged regions – would garner such a flood of interest.

Her concept, which she calls sWell, started out as project for a landscape architecture course. The solar-powered raft not only turns contaminated water into clean drinking water but provides shelter and transportation during a natural disaster.

These days Prokopchuk is busy sorting through business development proposals and potential funding opportunities from entrepreneurial experts to officials from the provincial and federal governments (when not working on her master's thesis focusing on monsoon-prone Bangladesh). She received so much local media attention in March she was forced to put all requests on hold while applying for a patent. All this after an invite to Qatar – where she was recognized as one of the world's top five design students at the Tasmeem Doha 2007 Design Conference. The 26-year-old was the sole Canadian to receive this honour.

"All of these people have been very helpful and supportive," Prokopchuk says. "I greatly appreciate all the continued support and queries from these individuals as well as numerous friends, family, faculty, and my advisors Ted McLachlan and Richard Perron." Prokopchuk looks forward to developing sWell so it can one day help save lives where global warming has caused monsoons and surging seawater levels.

(University of Manitoba Alumni Magazine August 2007)

Project description

sWell is a solar-powered, mobile, inflatable filtration unit. Its size and ability to float also allows it to be used as a temporary raft structure. These self-sustaining units act as water storage-tanks and filtration devices in rivers, lakes and flooded areas, both in times of flood and within homeostatic environments.

sWell helps to address the national and international water crisis; the unavailability of clean and safe drinking water in times of disaster as well as in everyday scenarios on smaller local scales, in nations in all stages of development. The project addresses water quality issues as well as alternative forms of energy in providing sustainable solutions for disaster preparedness/conservation and infrastructure. The underlying concept is based on biomimicry, or the use of natural or biological systems to help inform design decisions, attempting to reveal the intrinsic relationship among design, imaginative perspective, and science. The form and functions of these free-roaming modules are analogous in part, to the structure and utilities of cellular eukaryotes.

The project explores notions of bodily swelling in relation to the context of a flooded landscape. The product is a solar-powered, mobile, inflatable filtration unit titled a sWell. sWell has the potential to be used at both a national and international scale, for crisis situations where there is a need for drinking water. Additional applications include use at a cottage where lake water is compromised, in recreational waterways as well as uses for livestock.

Primary Importance/Issue: In times of crisis such as a flood, where there is ample water, albeit undrinkable, relief organizations have the continuous, cumbersome task of delivering millions of bottles of water, which is the number one need in all disasters. sWell is a portable filtration unit that can be quickly deployed in place of bottled water, as it has the ability to rapidly filter flood, or grey water into potable water. sWell maximizes a readily available resource like flood water, rather than relying on the continual dispersal of outside supplies. It is a self sufficient unit that would function for the duration of the crisis as well as in the aftermath, thus alleviating some of the vast relief efforts. The product is specific in addressing water quality issues as well as alternative forms of energy in providing sustainable solutions for disaster preparedness, mitigation and temporal architecture/infrastructure.

Measuring up to the target issues for sustainable construction

Quantum change and transferability

[Self assessment]

|★|★|★|★|★|

The inspiration and form of sWell is derived from principles of biomimicry. sWell draws on the metaphor and visual expression of land as body. Replicating natural operating systems as a template fosters a cradle-to-cradle design approach that recognizes the importance of the integration of technical and biological nutrients. sWell combines a variety of existing materials/products/technologies and employs them in a novel way. The simple, but innovative packaging of solar, inflatable and filtration technologies allowed sWell to meet the requirements of obtaining a process or concept patent for North America. This technology is adaptable in a variety of global contexts, scales and applications; disaster/crisis situations, consumer/recreational uses, and industrial/agricultural scenarios.

Ethical standards and social equity

[Self assessment]

|★|★|★|★|★|

sWell responds to the global water crisis by addressing every individuals fundamental right to safe and clean drinking water. By doubling as a raft structure, it also provides temporary refuge for those inundated in surging flood waters. sWell becomes an icon within the landscape creating awareness of the many social, economical, political, psychological and ecological issues surrounding water.

Ecological quality and energy conservation

[Self assessment]

|★|★|★|★|★|

sWell uses solar energy and filtration-membrane technology to recycle grey water into potable, thereby creating a new water source out of a pre-existing, but compromised one. sWell solves the problem on site, reducing overall waste and consumption. The ecological-footprint of the distribution of bottled water is massive, whereas sWell is a self-sufficient, reusable, simply deployed product.

Economic performance and compatibility

[Self assessment]

|★|★|★|★|★|

sWell will be successful because it fills a fundamental need for clean water, solves a problem for disaster relief, is technically feasible to produce and it is a differentiated product based on what the competition offers. Some of the unique program service goals for sWell include the opportunity to extend the life of the original product through the core return/recycling program and a technical training program. Customers can return portions of their sWell, to be replaced, or to be reworked for future sales if possible. The customer can send in portions of their old sWell for re-use in other products or they can simply recycle them. A program will provide training to local peoples on the use of sWell and effective methods of rapid deployment into disaster areas.

Contextual and aesthetic impact

[Self assessment]

|★|★|★|★|★|

Like the limb of a body, sWell is in tandem with its environment: an injury, manifested in the skin [land] from a breakage [flood] of local capillaries [water bodies]; results in the leakage of cells [sWells]. Swelling fades as the body metabolizes [purifies] the cells of the [land]. Its multiplicity of applications allows sWell to adapt, evolving within a variety of contexts and circumstances.

patent #60/896, 952

FIELD OF THE INVENTION

The present invention relates to a filtration device for water which is readily portable, and more particularly relates to a filtration device which is arranged to be self-supporting floatably in a body of water.

BACKGROUND

The national and international water crisis, the unavailability of clean and safe drinking water in times of disaster as well as in everyday scenarios on smaller local scales in nations in all stages of development are an ongoing problem, for example in the applications of Recreational waterways; Livestock; Algae blooms (lake application); and Disaster mitigation, both developed and developing nations.

In times of crisis such as a flood, where there is ample water, albeit undrinkable, relief organizations have the continuous, cumbersome task of delivering millions of bottles of water, which is the number one need in all disasters.

SUMMARY OF THE INVENTION

The device according to the present invention, referred to herein as sWell, is a portable filtration unit that can be quickly deployed in place of bottled water, as it has the ability to rapidly filter flood, or grey water into potable water. It also provides a safety raft when habitants are inundated with water. Swell maximizes a readily available resource like flood water, rather than relying on the continual dispersal of outside supplies. It is a self sufficient unit that would function for the duration of the crisis as well as in the aftermath, thus alleviating some of the vast relief efforts. The product is specific in addressing water quality issues as well as alternative forms of energy in providing sustainable solutions for disaster preparedness, mitigation and temporal infrastructure. The underlying concept is based on biomimicry, or the use of 'natural' or biological systems to help inform design decisions, attempting to reveal the intrinsic relationship among design, imaginative perspective, and science.

Based on its universality, its current and imminent necessity, the production and manufacturing of sWell becomes a lucrative investment for the private investor, international relief organizations like the Red Cross, or governmental departments such as DART. It becomes profitable not only in terms of financial means to investors, but also to the forward movement of sustainable developments, and to every individual who has the fundamental right to clean and safe drinking water.

The device according to the present invention is a solar-powered, mobile, inflatable filtration unit titled a sWell. Its ability to float and its size also allows it to be used as a temporary raft or shelter structure. The form and functions of these free-roaming modules are analogous in part, to the structure and utilities of cellular eukaryotes. These units are to act as water storage tanks and filtration devices in rivers, lakes and flooded areas, both in times of flood and within homeostatic

environments. sWell has the potential to be used at both a national and adaptable international scale for crisis situations where there is a need for drinking water.

According to one aspect of the present invention there is provided a portable filtration device for filtering water from a body of water, the device comprising:

an inflatable floatation chamber arranged to support the device to float on the body of water;
a filtration housing arranged to be suspended from the floating chamber in the body of water;
the filtration housing having an inlet, an outlet, and a filtration medium arranged to filter water passing therethrough from the inlet to the outlet;
the inlet being arranged for communication with the body of water; and
the outlet being arranged for communication with a filtered water reservoir.
One embodiment of the invention will now be described in conjunction with the accompanying drawings in which:

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a schematic view of the various components of the portable filtration device.
Figure 2 is a partly sectional elevational schematic view of the device.
Figure 3 is another partly sectional side elevational view of the device.
Figure 4 is a top plan view of the device.
Figure 5 is a perspective view of the device in a deflated position.
Figure 6, Figure 7, Figure 8 and Figure 9 are respective top, bottom, side and perspective views of the inflated device.
Figure 10 is a partly sectional perspective view of the device.
Figure 11 is a perspective view of the solar panels supported above the filtration housing and the dispensing pump of the device.
Figure 12 is a perspective view of the floatation chamber and the inflatable support frame.
Figure 13 is a perspective view of the filtered water reservoir supported below the floatation chamber.
Figure 14 is a perspective view of the outer skin covering the device.
In the drawings like characters of reference indicate corresponding parts in the different figures.

DETAILED DESCRIPTION

Referring to the accompanying figures there is illustrated a portable flirtation device generally indicated by reference numeral 10. The device 10 is particularly suited for providing a device arranged to filter polluted water in remote locations, typically on a temporary basis. The device can be expanded to an in use position and subsequently collapsed into a storage or transport position using flexible materials and inflatable support structures.

The device 10 generally includes a floatation chamber 12 which is circular when viewed in plan view so as to include a circular top wall 14 and a circular bottom wall 16. A generally annular peripheral wall 18 defines a generally cylindrical shaped hollow interior which is inflated with air so as to be arranged to be buoyant on the surface of a body of water. The flexible walls expand and collapse as required for use and for storage. The general shape of the floatation chamber 12 is arranged to be very broad in relation to the height thereof so as to be stably supported on the surface of the water.

The device further includes a filtered water reservoir 20 arranged to be suspended below the floatation chamber 12. The reservoir 20 is generally conical in shape including a peripheral wall 22 which extends downwardly and inwardly to a bottom apex 24 from the annular peripheral wall 18 of the floatation chamber thereabove. The bottom wall 16 of the floatation chamber defines the only separation between the reservoir 20 and the floatation chamber 12 thereabove and generally comprises a sealed flexible membrane. The walls of the reservoir are also flexible for collapsibility in storage. The hollow interior of the reservoir defined by the peripheral wall 22 defines the storage area for storing water which has been filtered by a filtration housing 26.

The filtration housing 26 comprises a generally cylindrical shell forming an upright column extending within the interior of the reservoir 20 from the bottom apex 24 thereof, which locates the inlet 28 of the filtration housing 26, to a top end, locating an outlet 30 of the filtration housing spaced just below the floatation chamber thereabove. A perforated cylindrical collar 32 extends from the top end of the filtration housing to the bottom wall 16 of the floatation chamber which includes perforations therein so as to permit water flowing out of the outlet of the filtration housing to flow through the perforations and into the surrounding reservoir 20. The filtration housing 26 permits a plurality of different types of filtering members, each arranged to be supported interchangeably therein depending upon the required use of the device.

A support frame is provided in the form of a plurality of inflatable members 34 which comprise elongate ribs extending radially outwardly from the center of the top wall of the floatation chamber, at circumferentially spaced positions relative to one another. Each floatation member 34 spans from the center of the floatation chamber to the annular peripheral wall 18 thereof in a radial direction before then extending downward along the peripheral wall 22 of the reservoir 20 while tapering radially inward therewith to the bottom apex 24 where all of the inflatable members 34 are again joined with one another. The inflatable members 34 are arranged to be sufficiently rigid when inflated with air under pressure to provide structural support to maintain the general relative relationship between the upper flotation chamber, the reservoir supported therebelow and the filtration housing which is centrally located within the reservoir such that the reservoir surrounds the filtration housing. A suitable rapid inflation mechanism 36 is integrally supported on the device in communication with the inflatable members 34 and the upper floatation chamber to rapidly inflate the inflatable members during deployment from the storage position to the in-use position as required.

The device is operated by a primary pump 38 which pumps water from the surrounding body of water into the filtration housing and a secondary pump 40 supported within the reservoir which pumps filtered water from the reservoir to a dispensing hose 42 for subsequent use by the user. The primary pump 38 is located at the bottom end of the filtration housing in communication

with the inlet thereof to receive water from the body of water at the bottom apex 24 of the device and for subsequently pumping the water upwardly through the filtration housing to overflow from the outlet thereof into the surrounding reservoir 20. The primary pump 38 is operated responsive to a fluid level sensor in the reservoir so that the pump 38 continues to pump water into the reservoir until the reservoir reaches a prescribed fill level, at which point the pump shuts off until the reservoir is depleted below the prescribed fill level.

The secondary pump 40 includes an inlet in communication with the water in the reservoir at the bottom end thereof and pumps the water through a hose upwardly to a central dispensing cap 44 centered in the top wall of the floatation chamber. A dispensing hose 42 is provided which comprises a flexible hose coupled to the outlet of the secondary pump 40 through the dispensing cap 44. The hose 42 is received in a suitable housing which is arranged to retract the hose therein into a coil for storage.

Power is provided to each of the pumps, which are electrically operated, by a battery 46 charged by solar panels 48. The battery 46 is housed within a compartment within the floatation chamber 12 which is accessible through a suitable access panel in the top wall that can be sealed closed in use.

The solar panels 48 each comprise an elongate flexible member spanning the top wall 14 of the floatation chamber to extend radially outward from the dispensing cap 44 to the annular peripheral wall 18 of the device. The solar panels are arranged to be of flexible material so as to permit folding thereof during collapsing of the device for storage.

A motor 50 may be provided which is supported adjacent the bottom end of the device and includes a suitable propeller thereon which is arranged to propel movement of the device laterally across the body of water.

The device further includes a plurality of grommets 52 at circumferentially spaced positions about the top wall 14 of the floatation chamber which serve as anchoring points for various tow lines or accessories to be mounted. One such accessory for example includes a ladder attachment 54 which permits users to readily climb onto the top wall of the floatation chamber which then acts as an upper deck arranged to support several persons thereon. Although the top wall is generally horizontal, the top wall preferably has a slight slope which extends downward and outward from the center cap to the annular peripheral wall to assist in runoff of water collected thereon.

In use the device 10 can be deployed by use of the inflation mechanism 36 to rapidly inflate the inflatable members 34 of the supported frame and the floatation chamber 12 so that the floatation chamber can be floated on a body of water with the reservoir and the filtration housing suspended therebelow. Operating the pump 38 causes water to be drawn in through the bottom apex from a surrounding body of polluted water within which the device is suspended. The polluted water is filtered through passage through the filtration housing so that clean filtered water is dispensed from the outlet of the filtration housing into the surrounding reservoir. The secondary pump can then be actuated by the user based on demand of water being dispensed from the dispensing hose 42. Power for the pumps can be collected for ongoing usage of the pumps for extended period of time. When it is desired to store or transport the device, the inflatable members 34 of the support frame and the upper floatation chamber 12 can be deflated and the solar panels can be folded so that the floatation chamber and the reservoir can be collapsed and folded radially inwardly about

the centrally located filtration housing 26. The device can then be stored within an upright narrow container for ease of shipping and storage.

As described herein, the invention generally comprises an inflatable structure with an upper floatation chamber suspending a filtration system, housing a purified water ballast reservoir below it. Skin on the device comprises a waterproof canvas like material, similar to those used in inflatable boats or recreational water apparatuses. A membranous seal separates the air chamber from the water chamber, as well as the one way valve of the outtake hose. Structural air ribs provide support to the unit, the shape of the filled water ballast provides stability when in water to prevent tipping. Inflatable ballast has a slight 2% slope for water runoff.

The device 10 includes an outer skin referred to as a sWell skin, comprising therma-bonded polyurethane/Duotex. The total weight of device at full capacity is approximately 2100 kg in the illustrated embodiment. Considering 1 L of water = 1 Kg, the device therefore holds roughly 2000 L of water with a holding tank which is 2 cubic meters. The pumps and filters are arranged to reach full capacity of the device in approximately 12 hrs at a rate of 56Gal/hr. Also in the preferred embodiment, the solar panels generate 125 watts and the solar battery life is 29.5 hrs. As an average household uses 375 L of water a day, one filter cycle = 5 days of full water supply.

In preferred embodiments, the device 10 has the following features:

-Unit inflates by a fuel cylinder with firing head contraption, or chemical pack similar to those used in inflatable boats, air levels maintained by manual hand pump.
-Upper flotation pocket also double as a raft-structure, in times of flood or complete inundation of water, where a flotation device is required.
-Possible small floating platform with rope ladder allows for easy access.
-Solar panels are those of the variety that are thin, flexible and waterproof, and lie on top of unit, exposed to the sun.
-Dual intake-outtake pumps and hoses are operated by solar polar and battery. Battery is housed within the air pocket. Submersible cables attach energy source to pumps.
-A cylinder-type structure or holding canister houses the filter mechanism or filter membrane. These filters can be specific to location/situation and corresponding water borne diseases or parasites (e-coli, cholera, dysentery etc) chemicals (such as arsenic) or salt.
-The filtration cylinder, battery, hoses, cables and control panel can be accessed for replacement or maintenance through a rubberized, zippered compartment or opening in the inflatable skin.
-Contaminated water enters at bottom of unit through intake pump, flows through filter mechanism, spills through water holes, thus filling the water ballast. Signaling mechanism, like that used in a toilet, controls the start and stop of the filtering water. Clean water is accessible through the top of the structure via the outtake pump and hose that runs through the inflatable pocket and out the centre of the unit closed with a hose-cap.
-Possible attachments such as a retractable hose or faucet-like module can attach to the hose-cap depending on the unit's application.

-Grommet rings on top sides of sWell skin, allow the unit to be anchored, tied to a boat tow, dock, or another anchoring structure of choice.
Since various modifications can be made in my invention as herein above described, and many apparently widely different embodiments of same made within the spirit and scope of the claims without department from such spirit and scope, it is intended that all matter contained in the accompanying specification shall be interpreted as illustrative only and not in a limiting sense.

CLAIMS:

1. A portable filtration device for filtering water from a body of water, the device comprising:

an inflatable floatation chamber arranged to support the device to float on the body of water;
a filtration housing arranged to be suspended from the floating chamber in the body of water;
the filtration housing having an inlet, an outlet, and a filtration medium arranged to filter water passing therethrough from the inlet to the outlet;
the inlet being arranged for communication with the body of water; and
the outlet being arranged for communication with a filtered water reservoir.

2. The device according to Claim 1 wherein the inflatable floatation chamber is arranged to be collapsible radially inwardly about the filtration housing.

3. The device according to either one of Claims 1 or 2 wherein the filtered water reservoir is integrally supported below the floatation chamber in communication with the outlet of the filtration housing.

4. The device according to any one of Claims 1 through 3 wherein the filtered water reservoir is suspended below the floatation chamber.

5. The device according to Claims 4 wherein the filtered water reservoir tapers downwardly and inwardly from a periphery of the floatation chamber.

6. The device according to either one of Claims 4 or 5 wherein the reservoir surrounds the filtration housing and the inlet of the filtration housing is located at a bottom end of the device.

7. The device according to any one of Claims 4 through 6 wherein the filtration housing is laterally centered with respect to the floatation chamber and the water reservoir.

8. The device according to any one of Claims 4 through 7 wherein the water reservoir and the floatation chamber are separated only by a sealed membrane.

9. The device according to any one of Claims 1 through 8 wherein the filtration housing comprises an upright column locating the inlet at a bottom end thereof and the outlet at a top end thereof spaced below the floating chamber and in communication with a surrounding water reservoir.

10. The device according to any one of Claims 1 through 9 wherein there is provided a primary pump arranged to pump water from the body of water through the filtration housing and into the water reservoir.

11. The device according to Claims 10 wherein the primary pump communicates with the inlet of the filtration housing.

12. The device according to any one of Claims 1 through 11 wherein there is provided a one way valve in communication with the outlet of the filtration housing to permit filtered water to only be dispensed from the device.

13. The device according to any one of Claims 1 through 12 wherein there is provided a secondary pump arranged to pump filtered water from the reservoir to a dispensing hose.

14. The device according to Claim 13 wherein the dispensing hose comprises a flexible hose supported retractably within a respective housing.

15. The device according to any one of Claims 10 through 14 wherein there is provided at least one solar panel supported on a top side of the floatation chamber to provide power to the pump.

16. The device according to Claims 15 wherein said at least one solar panel is foldable for storage when deflating the floatation chamber.

17. The device according to any one of Claims 1 through 16 wherein the filtration housing includes a pump and a battery associated therewith and wherein the filtration housing, the pump and the battery are accessible through a top side of the floatation chamber through an access panel.

18. The device according to any one of Claims 1 through 17 wherein there is provided a pump in association with the filtration housing which is operable responsive to water level in the reservoir being below a prescribed level.

19. The device according to any one of Claims 1 through 18 wherein there is provided a support frame supporting the floatation chamber in relation to the filtration housing in which the support frame is comprised of inflatable support members.

20. The device according to any one of Claims 1 through 19 wherein the inflatable floatation chamber is arranged to be inflated by an integral rapid inflation mechanism.

21. The device according to any one of Claims 1 through 20 wherein there is provided a plurality of different filtration members arranged to be supported within the filtration housing between the inlet and the outlet, the different filtration members being interchangeable with one another.

22. The device according to any one of Claims 1 through 21 wherein the floatation chamber includes a top wall which tapers downwardly and outwardly from a center thereof.

23. The device according to any one of Claims 1 through 22 wherein the floatation chamber includes a top wall arranged to span generally horizontally and support persons thereon.

24. The device according to any one of Claims 1 through 23 wherein the floatation chamber includes a plurality of anchor points integrally formed on an exterior side thereof.

25. The device according to any one of Claims 1 through 24 wherein there is provided a submersible motor suspended below the floatation chamber in the body of water which is arranged to propel the device across the body of water.

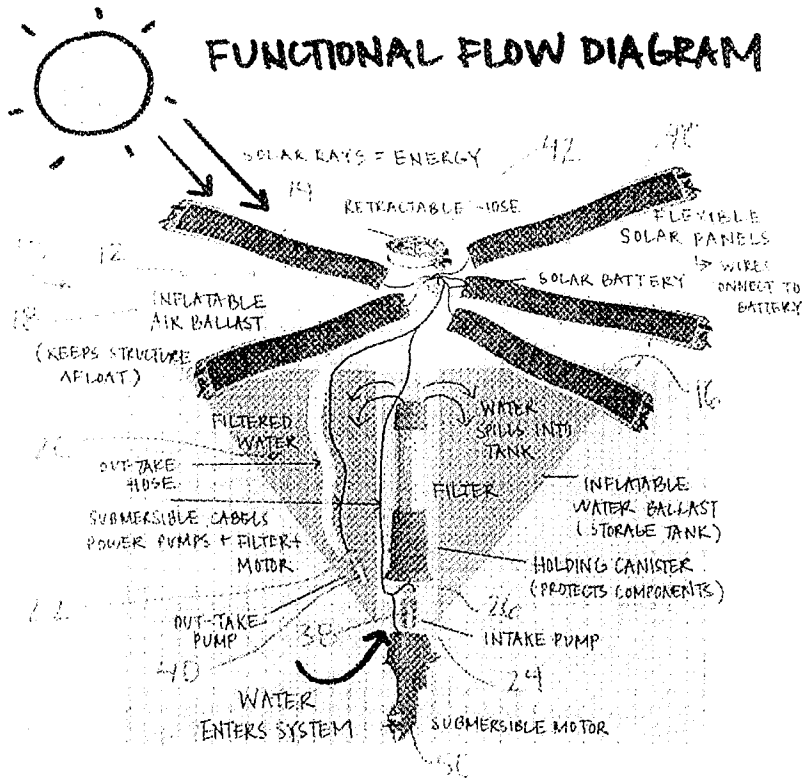

FUNCTIONAL FLOW DIAGRAM
SOLAR RAYS = ENERGY
RETRACTABLE HOSE
FLEXIBLE SOLAR PANELS
WIRES CONNECT TO BATTERY
SOLAR BATTERY
INFLATABLE AIR BALLAST
(KEEPS STRUCTURE AFLOAT)
FILTERED WATER
WATER SPILLS INTO TANK
OUT-TAKE HOSE
FILTER
INFLATABLE WATER BALLAST (STORAGE TANK)
SUBMERSIBLE CABLES POWER PUMPS + FILTER + MOTOR
HOLDING CANISTER (PROTECTS COMPONENTS)
OUT-TAKE PUMP
INTAKE PUMP
WATER ENTERS SYSTEM
SUBMERSIBLE MOTOR

FIG. 1

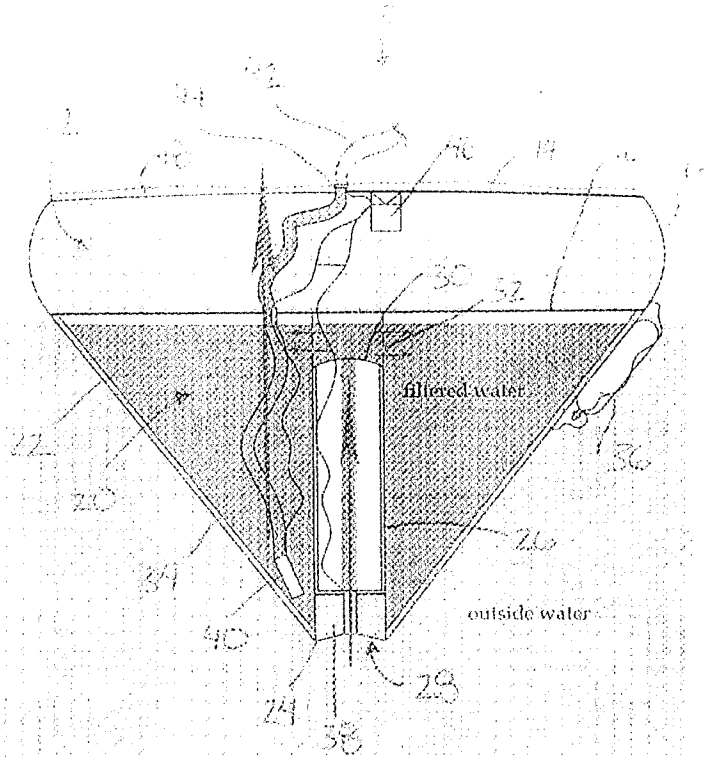

filtered water
outside water

FIG. 2

section.

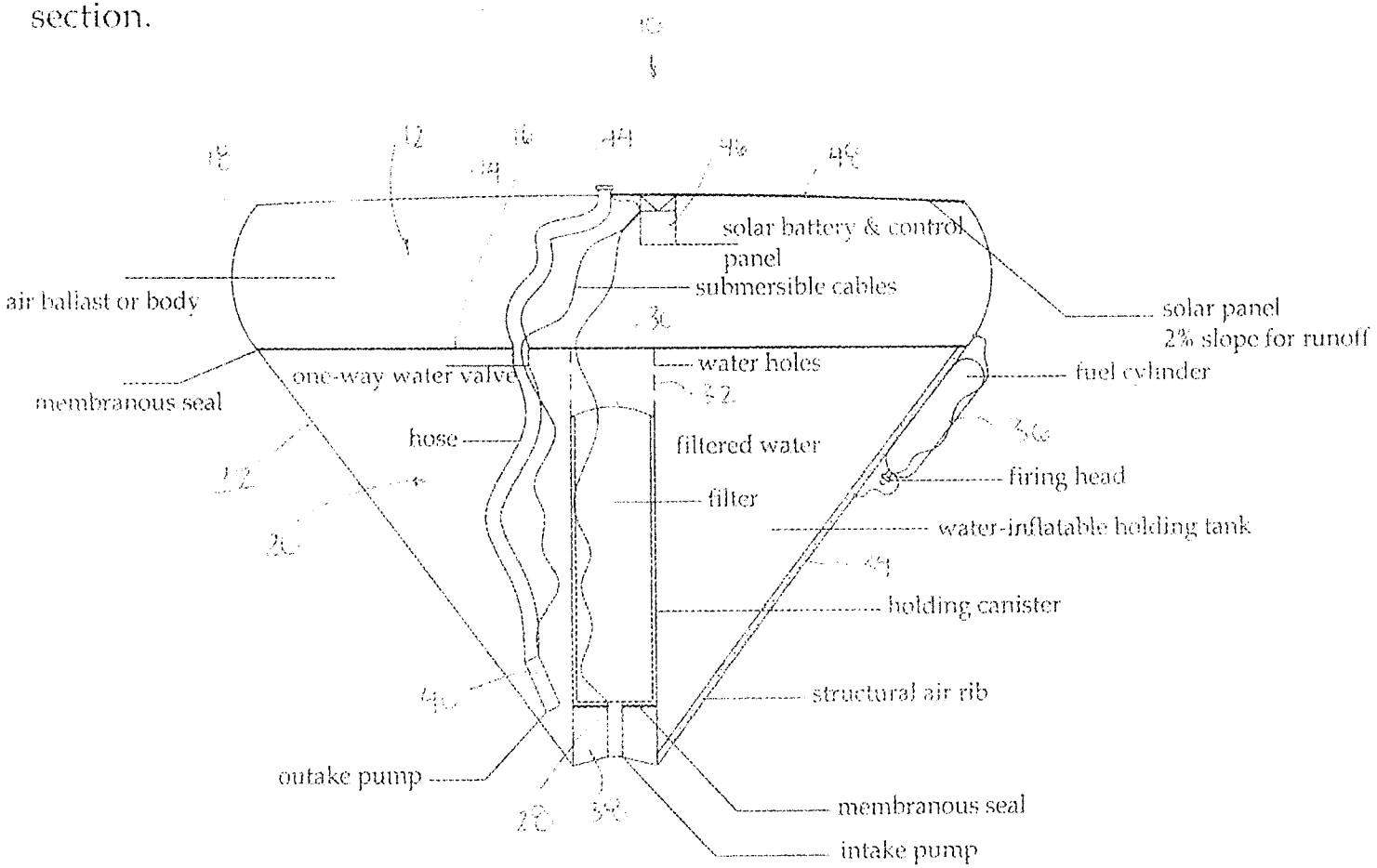


FIG. 3

plan-view.

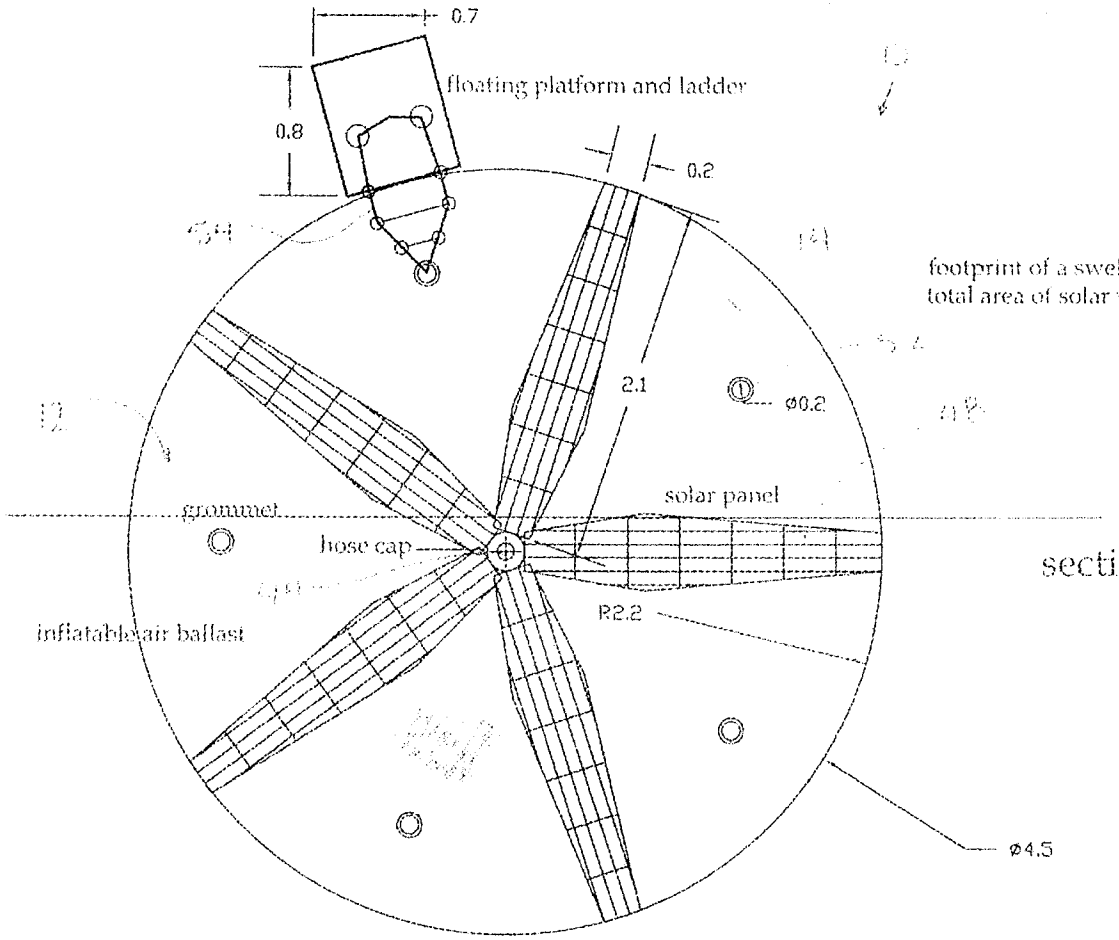
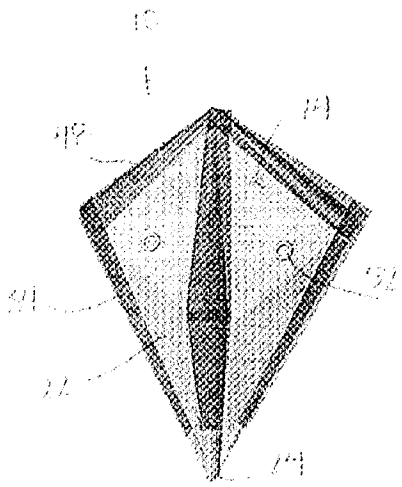


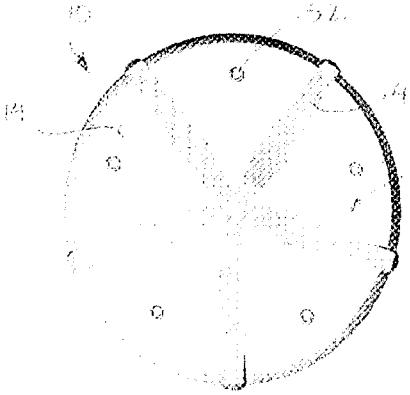
FIG. 4

footprint of a swell in plan view = 15.9 sq m
total area of solar panels = 2.5 sq m
total watts = 125

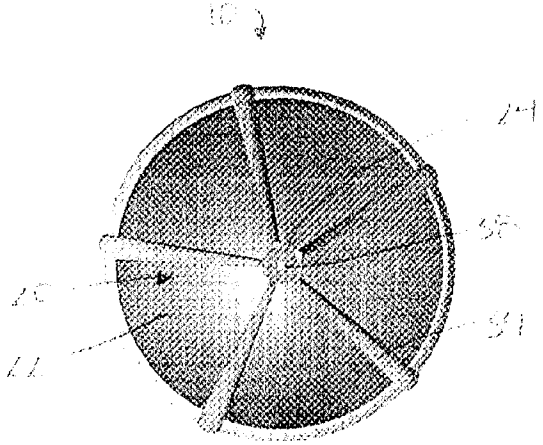
inflated views.



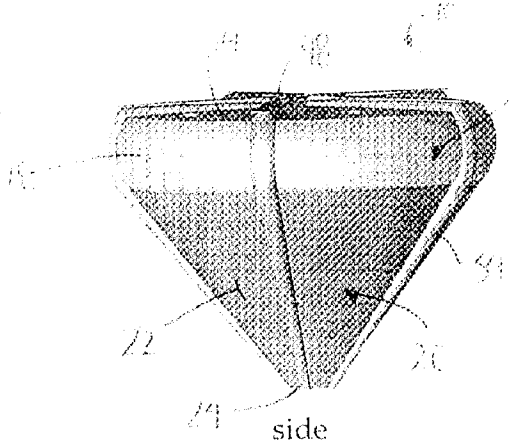
deflated sWell capsule



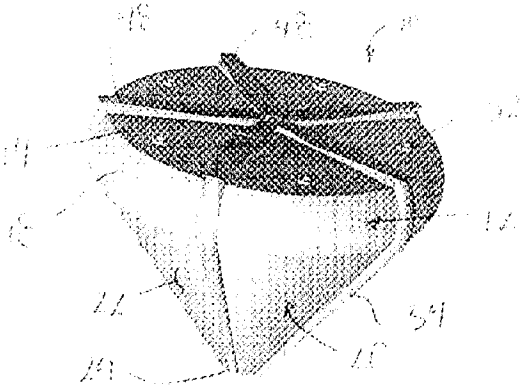
top



bottom



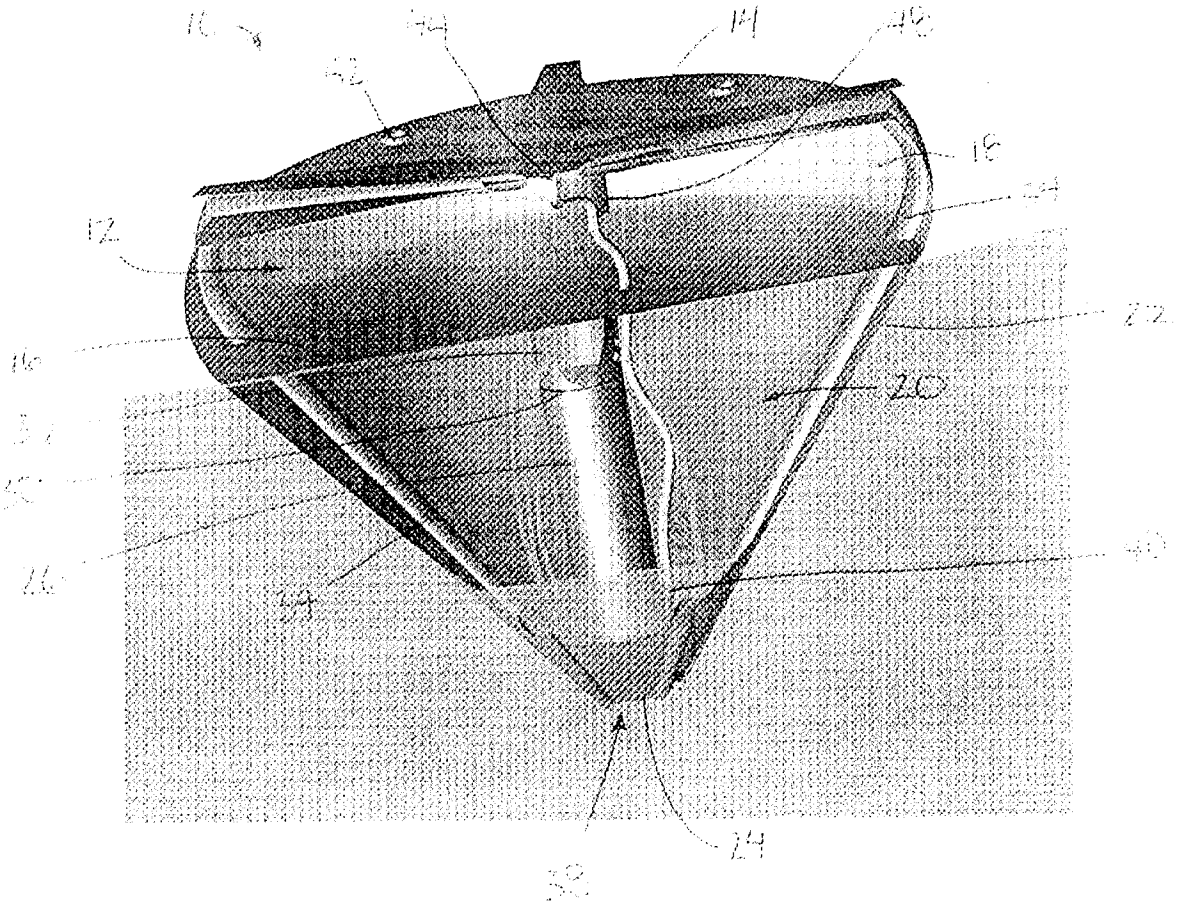
side



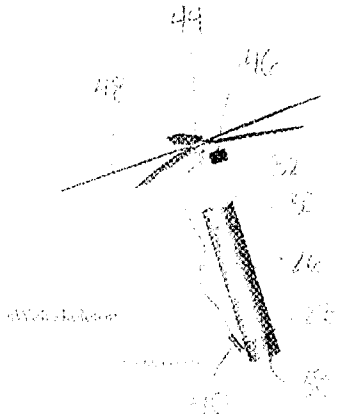
perspective

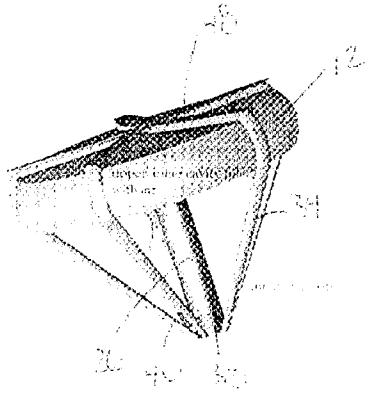
filtering water.

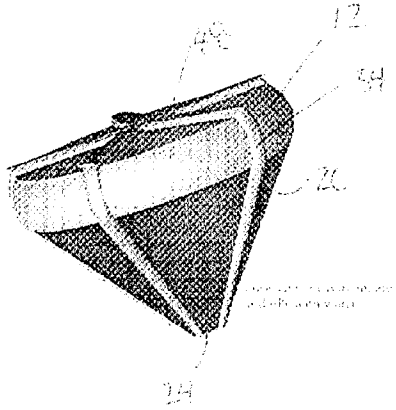
FIG. 1C

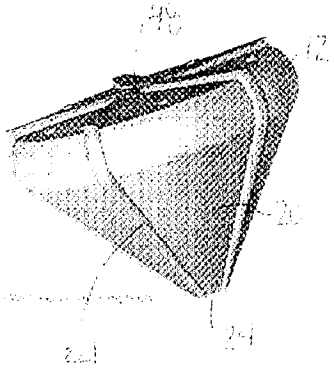


3d views: inflated.









feasibility study

Feasibility Study - sWell

In conjunction with Craig Ostermann

Executive Summary

sWell is a solar-powered, mobile, inflatable filtration unit that provides an additional source of fresh water during crisis or in times of disasters. According to the Red Cross more than one billion people do not have access to clean water and some four million people die each year from diseases associated with the lack of access to safe drinking water, inadequate sanitation and poor hygiene. This product can fill a need (lack of clean water) and solves a problem (disaster relief).

The sWell is different than other products on the market due to its size and portability of the product. The unique features of the sWell are its ability for rapid deployment, filter floodwater into drinkable water, acts as a water storage tank and a flotation device.

The target customers of sWell are the North American Governments and Non-Government Organizations. The Canadian Federal Government spends $20 billion on the procurement of goods and services while the US government spends an estimated $500 billion annually on goods and services. During the month of May the Red Cross is actively supporting relief activities in five different countries where drinking water needs to be made available.

The company will final assembly the sWell in Winnipeg using various suppliers who will supply the pieces required to produce the sWell. Technology required to make the sWell such as solar energy, filtration, pumping systems and inflatable material is all available and are being used in other products.

The major costs to start the venture are inventory, fixtures and equipment and leasehold improvements. $65,000 will be required and will be financed through a combination of debt and equity. An operating loan will be obtained to start the business. A line of credit will also be obtained to ensure that the monthly minimum cash flow is maintained. The equity will come from the two owners of the company and additional family member.

The company projects to lose $44,004 in the first year of operations due to low sales and high variable costs including higher than normal advertising and travel costs. The first half of the year will be spent on building a functioning prototype and advertising the product. The projections for sales of the sWell are for six units starting in September of the first year.

Based on the feasibility study it is recommended that a comprehensive business plan being written for sWell. Some further analysis is required during the business plan process such as additional information on the competition and market share. We believe that the sWell will be successful because it fills a need for clean water, it solves a problem for disaster relief, it is technically feasible to produce and it is differentiated product based on what the competition offers.

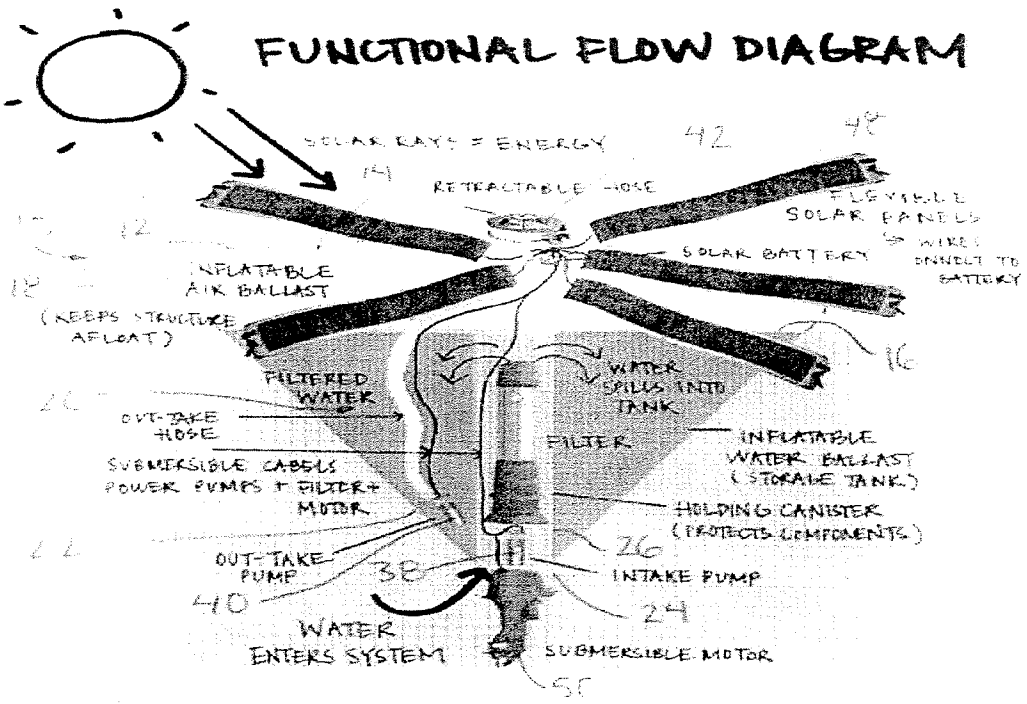
Introduction

Once a business concept has been developed a detailed analysis and evaluation must be undertaken to determine if the concept can become a profitable reality in the years to come. This paper will outline the feasibility of developing and selling a portable water filtration product called sWell. The paper will outline the sWell concept, marketing plan, and supply situation. A cost/profitability analysis will be performed to determine financial viability. This analysis will then lead to a plan for future action.

Concept

A sWell is a solar-powered, mobile, inflatable filtration unit that provides an additional source of fresh water during water crisis or in times of disasters. The unit can produce up to 440 gallons of fresh drinking water per day. Figure 1, provides a functional diagram of the concept.

Figure 1 – Functional Diagram of the sWell



Some unique features of the sWell are:

- Rapid deployment in place of bottled water;
- Ability to rapidly filter flood or grey water into drinkable water;
- Self-sustaining unit that acts as a water storage tank and a filtration system;
- Ability to be used as a safety raft during a flood.

Other available products are larger in scale, are driven into the area for use and must be monitored periodically during the ongoing use of the product.

The primary customers of the sWell are governments, non-government organizations (NGO), recreational users and agriculture. The benefits to these customers are:

- Governments/NGO – ability to quickly deploy water in times of need;
- Recreational Users – source of water at cottages where water is currently trucked in;
- Agriculture – provide clean drinking water that is essential for the growth and production of livestock.

The sWell ranks as moderately innovative as it uses existing technology such as solar energy, filtration, pumping systems and inflatable material to form the product. There are no other products in the marketplace that exactly match the sWell.

The idea is very feasible as the technology is available and has proven to be effective in other applications. Initial meetings with the National Research Council and experts in the water filtration industry have indicated that the concept is technically feasible with some minor modifications required to the conceptual design. At the moment, there is no working prototype for the sWell. The plan is to build a functional model for display during the initial capital funding efforts and then build a full scale-working prototype to display at trade shows. The full-scale model will be required for trial runs and certification by the Canadian Standards Association (CSA). CSA approval is required to market the sWell to various target markets within Canada.

Marketing Plan

Products and Services

The products and services offered with the sWell include:

- Training –Training on the use of sWell and effective methods of rapid deployment into disaster areas. It will include in person training to large customers. Manuals will be provided with each sWell;

- Disaster relief team – Onsite team provided for technical support and assistance;

- Replacement parts – The sWell will include replacement parts such as a patch kit to be used if the flotation portion of the product requires minor repairs.

Additional customer services will also be offered to customers including:

- Core Return Program – Customers can return portions of their sWell, such as the pump, to be replaced. The old pump will be reworked for future sales if possible.

- Recycling Program – The customer can bring or send in portions of their old sWell for recycling. The company will look for markets for those products or simply recycle them.

- Standard Warranty – The sWell will have a warranty for each unit sold where exchange or refund will be provided to the customer within the first year.

- Delivery – The cost of delivery is included in the product and will be chosen and arranged by sWell. If a customer picks an alternate shipping method, the company will accommodate as necessary charging the difference to the customer.

Some of the unique items of the total product offering for sWell include the opportunity to extend the life of the original product through the core return program and the technical training.

Customers

The customers for the sWell include:

- Consumer Market – Cottage owners who require a source of drinking water at their property.

- Government/NGO Market –The United States military, the Canadian military and various state and provincial emergency response teams will be targeted.

- Industrial Market – Customers in this marketplace include the agricultural sector - in particular livestock operations.

The phases of target market focus are:

1. North American Government/NGO;
2. North American recreation and agriculture;
3. International aid organizations and governments.

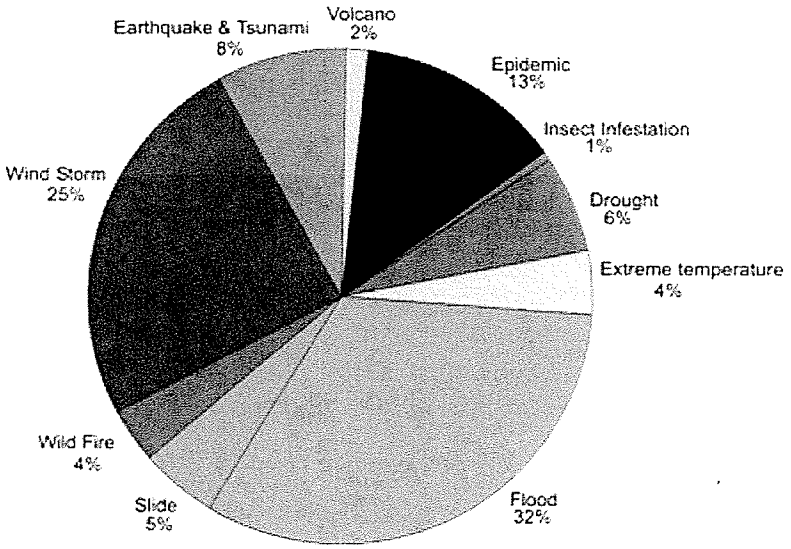
The company plans to progress through these markets as financial feasibility and available funds allow.

The potential Government/NGO market is very large in both the United States and Canada. According to the website for PWGSC, each year the Canadian Federal Government spends $20 billion on the procurement of goods and

services. In comparison, the US government spends an estimated $500 billion annually on goods and services. State and local governments in the United States spend another $500 billion combined. It is difficult to estimate an exact market size for the sWell product because these numbers combine all government departments.

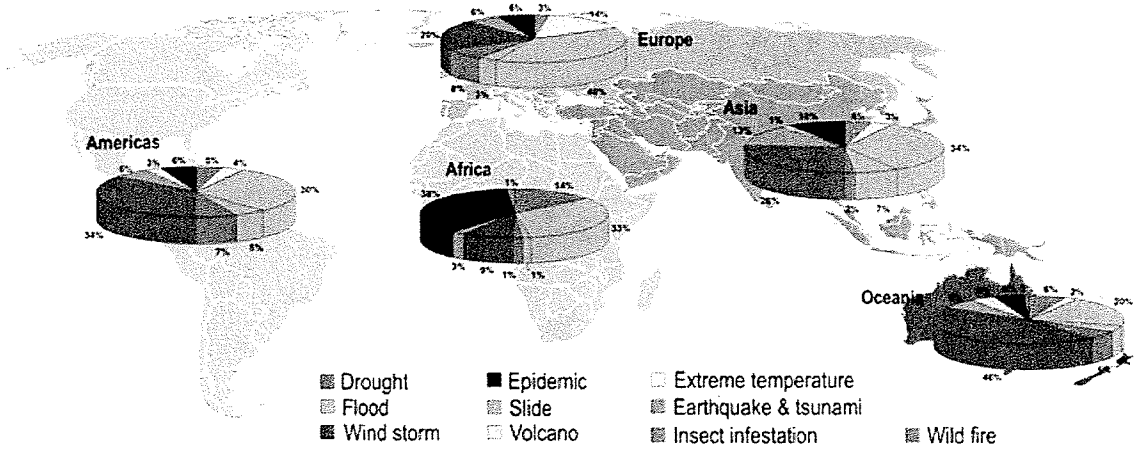
According to the Red Cross, in our world today more than one billion people do not have access to clean water and some four million people die each year from diseases associated with the lack of access to safe drinking water, inadequate sanitation and poor hygiene. As per the International Strategy for Disaster Reduction, floods have been the number one cause of disaster from 1991 to 2005.

Chart 1 – World Distribution of Disasters by type 2001 - 2005



Source: http://www.unisdr.org/disaster-statistics/occurrence-type-disas.htm

Chart 2 – Regional Distribution of Disasters by type 2001 - 2005



Source: http://www.unisdr.org/disaster-statistics/occurrence-type-disas.htm

A quick review of the intended target market shows a great deal of activity currently ongoing in flood disaster relief. Table 1, provides examples of areas of relief activity for the Red Cross.

Table 1- Current Red Cross Relief activities as of May 2007

Location	Disaster
Afghanistan	Spring Floods
Namibia	Floods
Tajikistan	Torrential Rains
Tanzania	Floods
Solomon Islands	Tsunami

sWell fills a need (lack of clean water) and solves a problem (disaster relief).

Competition

The sWell is positioned within the purification market. According to the Government of Canada, there are over 700 water and wastewater firms in Canada with annual sales totaling $1.4 billion CAD in this category. Goldman Sachs estimates that the $400 billion USD water distribution, purification and infrastructure sector is expected to grow by 4% to 6% a year in most developed countries, and as much as 15% a year in emerging markets. The competition within the water purification market includes the following companies:

- Spectra Watermakers, Inc. (www.spectrawatermakers.com) of San Rafael, California – They offer the Solar Cube powered by sunlight and wind. It has the capability to provide up to 3,500 gallons of clean drinking water per day. The unit is self-contained and has been used primarily in Asia, South

America, and Pakistan. Solar Cubes range in price from $38,000 to $80,000 USD and have a service life of at least seven years.

- WorldWater & Power (www.worldwater.com) of Pennington, New Jersey – They have taken their solar powered water pump and added a filtration system to it to develop the Mobile MaxPure which can purify up to 15,000 gallons a day. The firm's sales were $6M USD a year in 2006 and the filitration system sells for $50,000 USD.

- First Water Inc. (www.firstwaterinc.com) of Marietta, Georgia – They have a number of different products ranging in size from 25 pounds all the way up to mobile trailers that purify water. The systems run on solar power, are used by the military and have been deployed in countries such as Asia and South America. The systems filter between 1,500 and 50,000 gallons per day.

There are also a number of companies that have similar concepts currently in the development stage. Deka Research and Development has a conceptual idea called the Slingshot, which will clean and purify water. A search for patents similar to the sWell was also conducted to determine if any more competitors were to be considered. Two patents were found in the United States dated in 2006 and 1946.

One of the challenges with analyzing the competition was obtaining the sales figures and market positions for these companies. The companies are smaller in size and not public so financial information was not available.

The sWell is very different because of its ability to be rapidly deployed in a disaster area. Both the MobileMax Pure and Solar Cube must be trucked in to the area. While the sWell can be dropped into the area via plane if required. These products also need to be on land near the source of the water while the sWell actually floats in the water and can be used as a flotation device.

Location

The location for the business will be Winnipeg, Manitoba, Canada. The reason for selecting Winnipeg is both owners of the company currently reside in Winnipeg and it is an ideal location to reach customers in North America. According to the Government of Manitoba, "Manitoba's strategic location at the centre of Canada makes it a key part of the Mid-Continent Trade Corridor connecting manufacturers to a central North American market of 100 million people". Winnipeg also has one of lowest overall business costs as per a KPMG study in 2006 (Destination Winnipeg).

Pricing Strategy

The pricing strategy for the sWell will be value based pricing. One of the main reasons for using value based pricing is that there are no competitors with a like product. There are products that purify water but they are either on a larger or smaller scale. Since the product is unique, sWell believes that the price can be based on an estimate of the market's perceived value for the fundamental right to clean and safe drinking water. Even though the price will be based on value, sWell needs to consider that other similar substitute devices cost between $38,000 to $80,000 USD.

Promotion

The promotional budget for sWell in year one will $24,000 CAD which includes $12,000 for advertising and another $12,000 for travel. The budgeted money for travel will be to attend industry trade shows, one in Canada and one in the US, to promote the benefits of the product. We have also included an additional $5,000 as a start up cost to create a trade show booth. The theme of the advertising campaign will be based around every human's fundamental right to clean and safe drinking water at all times. In order to advertise the message the following avenues will be used:

- Paid Advertising – Publish advertisements in trade magazines such as Water World and the Canadian Water Resource Journal.

- Free Advertising – Send out press releases to major newspapers, television stations and trade magazines to see if a story can get published on the benefits of the product.

- Online Advertising – The company will develop an internet site (www.swellwater.com) to advertise the product. The website address will be published in all advertising and articles.

- Brochures – A series of brochures will be developed to be handed out at trade shows.

- Conferences – Another potential opportunity to advertise the product is by speaking at conferences and displaying a booth at trade shows. At the events, branded bottled sWell water will be provided to attendees for refreshment.

The participation at trade shows will be a key promotional activity for sWell. A large portion of money has been allocated to this in year one. A potential trade show to target is the World Conference on Disaster Management being held in Toronto in July of 2007. To take advantage of cooperative advertising sWell could possibly display the product at a trade show where one of our suppliers, such as the filtration manufacturer, is displaying their goods. Finally, the

company may consider loaning the working prototype to a Government department during a relief effort on a trial basis. This will get the product in the hands of the users and will provide sWell with some additional advertising by word of mouth.

Distribution

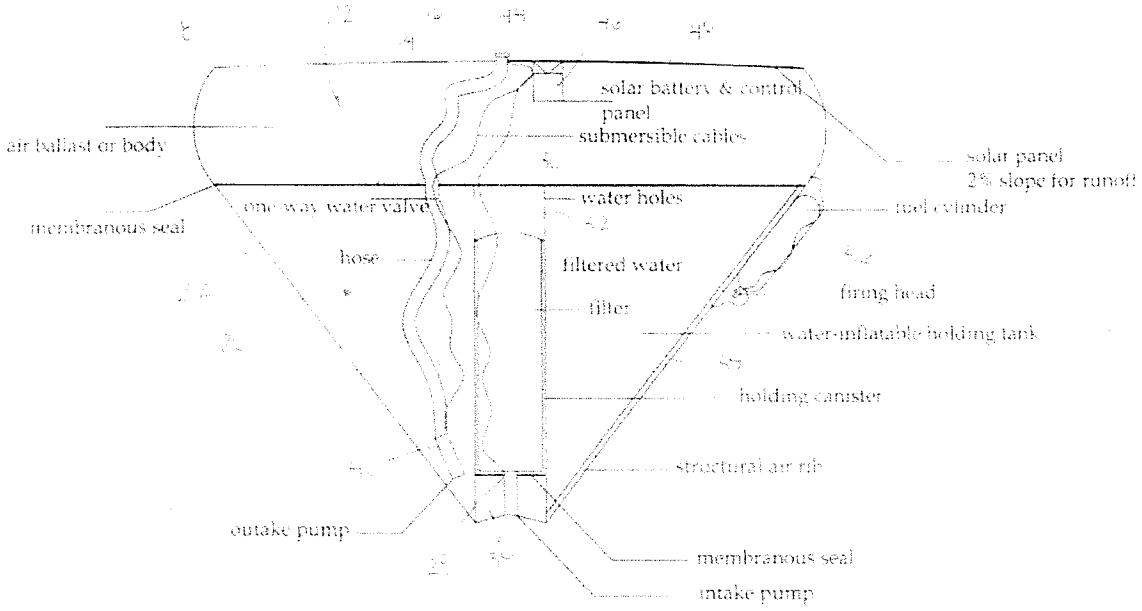
sWell will operate in a zero level distribution channel as the product will go from the manufacturer to the end customer and will be handled by sWell. The company will currently only service the North American marketplace but may consider selling territorial rights to specific regions of the world in later years. This will be determined based on the potential cost of selling the product in those territories.

In order to reach the target market, sWell will rely on one sales representative and the principal owner who will focus on North American sales in year one. Additionally, sWell will utilize trade shows and the internet as other possible methods to sell the product.

Supply Situation

Figure 2 outlines the material requirements for the sWell.

Figure 2 – Supply Requirements of sWell



The key materials that make up the sWell are the skin, pumps, solar panel and the filter. The skin will be made from therma-bonded polyurethane/duotex, which is a similar product used in inflatable boats. The key material required for production in year one is listed in Table 2.

Table 2 - Material Requirements sWell – Year One

Part	QPA	Total Requirement - Year 1
Inflatable Flotation Chamber	1	7
Filter	1	7
Holding Canister	1	7
Retractable hose	1	7
Intake pump	1	7
Outtake pump	1	7
Outtake hose	1	7
Submerisble motor	1	7
Submerisble cables	1	7
Submerisble power pump	1	7
Submerisble filter motor	1	7
Flexible Solar panels	5	35
Rapid Inflation mechanism	1	7

The technology for the pumps, solar panels and filters are available and potential sources have been identified from various manufacturing companies. The filter is based on membrane technology developed by General Electric (Zenon). The pumps and solar panels can be locally sourced from Waterrite Technologies and Solar Solutions respectively. Initial conversations have been held with suppliers for all major parts except the skin.

A prototype of the sWell is expected to cost between $80,000 to $100,000 CAD. The sWell will sell for $80,000 CAD per unit, which prices the product within the price range of the competition. Inventory will be required once production begins. We estimate that $385,000 worth of material will be required to meet the sales requirements of $480,000 CAD.

Once the prototype is built the company will focus on the supply chain. Supply sources are to be further developed to include volume discounts and credit terms.

The initial manufacturing requirements for sWell will be final assembly of the product in Winnipeg. The company will purchase all of the pieces from suppliers and then perform final assembly. This allows the focus of the company in the first few years to remain with marketing and sales.

Cost/Profitability Analysis

Funding Requested

The major capital costs involved in launching this venture are inventory, fixtures and equipment, installation, and leasehold improvements. They are listed in

Appendix 1. These total $65,000 and will be financed through a combination of debt and equity. The debt will be financed through a financial institution in order to fund the major expenditures. It is anticipated that an operating loan will be secured at around prime plus three percent. A business line of credit will also be established to ensure that the monthly minimum cash flow balance is maintained and that the company has adequate availability should any shortfalls arise.

The balance of the funding will come from an initial equity investment of $175,000 from the owners of the company. The owners will each have 45% ownership in the company while the remaining 10% will be sold to an outside investor for a $75,000 share of the company. The outside investor is a family member who has agreed to invest in the company. A buy back agreement is in place where the owners have the right to purchase back the share for $90,000 at the end of five years.

Financial Projections

Detailed financial projections have been provided in Appendices 2 through 5. The company projects to lose $44,004 in its first year of operations, due to low sales and high variable costs including high advertising and travel costs. The $480,000 estimated first year sales are below the break-even point of $568,008. The company plans to sell six sWell units starting in September 2008. The first half of the year will be spent developing the prototype unit for the sales effort. The cost of goods sold (COGS) utilized in the financials was based on data from Statistics Canada for the water industry. The upper half of company's COGS were 29% and the bottom were 55%. Since sWell is a start up company, 50% was used in the analysis. It is estimated that the company will reach its breakeven point of $568,008 in the beginning of 2009.

Cash flow projections indicate the initial debt and equity financing will provide sWell with adequate cash flow until September and October of 2008. The company is cash negative during these months due to the increased inventory requirements in order to meet the forecasted sales at the end of the year. The line of credit will have to be utilized in those months or the company may need to find ways to create the funding internally.

Plans for Future Action

The feasibility study for sWell outlined a number of strong and weak points for the new venture.

Strong Points:

- It fills a need for clean water;
- It solves a problem for disaster relief;
- It is a technically feasible product according to industry experts;
- It is differentiated - rapid deployment and ability to float.

Weak Points:

- Supply Chain – Assumptions were made in this section as to being able to obtain the necessary material. Further research on suppliers must be conducted to ensure source of supply and negotiation of terms and conditions on purchases.

- Competitor Analysis – A full understanding of the competition is required, as sales figures and market share have not been determined. Dun & Bradstreet reports will be required to obtain this information.

- Assumptions in the financial analysis – The financial analysis requires a review by an Accountant to clarify the projections and figures.

Based on the assessment and analysis and taking all assumptions into account, the business will not be profitable in the first year. If sales continue to grow and the company becomes more efficient in controlling expenses I believe that the company will make a small profit in the second or third year.

Conclusion

The sWell concept meets a demand and a market is available. Based on this I would recommend that a comprehensive business plan be written. Further information on the competition and market share must be obtained. Other information required in the plan includes company goals, a detailed operations plan, an implementation timeline and a write up on the management team. This will provide more information about the concept and can be used to obtain financing for the business. If the company works towards the plan there are many future opportunities for sWell.

Appendix 1 – Required Start-Up Funds

Schedule 1 — Required Start-Up Funds

Estimated Monthly Expenses

Item	Column 1 Your Estimate of Monthly Expenses Based on Sales of $480,000 Per Year	Column 2 Number of Months of Cash Required to Cover Expenses	Column 3 Cash Required To Start Business (Column 1 X Column 2)*
Salary of Owner-Manager	$4,000	2	$8,000
All Other Salaries and Wages	$6,000	3	$18,000
Rent	$1,000	3	$3,000
Advertising	$1,000	3	$3,000
Delivery Expense/Transportation	$1,000	3	$3,000
Supplies	$100	3	$300
Telephone, Fax, Internet Service	$500	3	$1,500
Other Utilities	$350	3	$1,050
Insurance	$100	3	$300
Taxes Including Employment Insurance	$300	4	$1,200
Interest	$200	3	$600
Maintenance	$300	3	$900
Legal and Other Professional Fees	$600	3	$1,800
Miscellaneous	$2,000	3	$6,000
Total Cash Requirements for Monthly Recurring Expenses:			**$48,650**

Starting Costs You Only Have to Pay Once

	Cash Required to Start Business
Fixtures and Equipment	$40,000
Decorating and Remodelling	$10,000
Installation of Fixtures and Equipment	$5,000
Starting Inventory	$10,000
Deposits with Public Utility	$2,000
Legal and Other Professional Fees	$3,000
Licenses and Permits	$1,000
Advertising and Promotion for Opening	$1,000
Accounts Receivable	$5,000
Cash	$10,000
Miscellaneous	$5,000
Total One-Time Cash Requirements:	**$92,000**
Total Estimated Cash Required to Start Business:	**$140,650**

*These Figures Are Typical for One Kind of Business. You Will Have to Decide How

Appendix 2 – Pro Forma Income Statement

SCHEDULE 2

Pro Forma Income Statement for sWell for the Year Ending 2008

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	TOTAL
1 Gross Sales	0	0	0	0	0	0	0	0	80,000	80,000	160,000	160,000	480,000
2 Less: Cash Discounts	0	0	0	0	0	0	0	0	0	0	0	0	0
A. NET SALES	$0	$0	$0	$0	$0	$0	$0	$0	$80,000	$80,000	$160,000	$160,000	$480,000
B. COST OF GOODS SOLD	$0	$0	$0	$0	$0	$0	$0	$0	$40,000	$40,000	$80,000	$80,000	$240,000
C. GROSS MARGIN	$0	$0	$0	$0	$0	$0	$0	$0	$40,000	$40,000	$80,000	$80,000	$240,000
Less: Variable Expenses													
7 Owner's Salary	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	48,000
8 Employee's Wages and Salaries	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	72,000
9 Supplies and Postage	100	100	100	100	100	100	100	100	100	100	100	100	1,200
10 Advertising and Promotion	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	12,000
11 Delivery Expense	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	12,000
12 Bad Debt Expense	0	0	0	0	0	0	0	0	0	0	0	0	0
13 Travel	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	12,000
14 Legal and Accounting Fees	600	600	600	600	600	600	600	600	600	600	600	600	7,200
15 Vehicle Expense	0	0	0	0	0	0	0	0	0	0	0	0	0
16 Maintenance Expense	300	300	300	300	300	300	300	300	300	300	300	300	3,600
17 Miscellaneous Expenses	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	24,000
D. TOTAL VARIABLE EXPENSES	$16,000	$16,000	$16,000	$16,000	$16,000	$16,000	$16,000	$16,000	$16,000	$16,000	$16,000	$16,000	$192,000
Less: Fixed Expenses													
18 Rent	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	12,000
19 Utilities (Heat, Light, Power)	350	350	350	350	350	350	350	350	350	350	350	350	4,200
20 Telephone	500	500	500	500	500	500	500	500	500	500	500	500	6,000
21 Taxes and Licenses	300	300	300	300	300	300	300	300	300	300	300	300	3,600
22 Depreciation	4,279	4,279	4,279	4,279	4,279	4,279	4,279	4,279	4,279	4,279	4,279	4,279	51,348
23 Interest	1,138	1,138	1,138	1,138	1,138	1,138	1,138	1,138	1,138	1,138	1,138	1,138	13,656
24 Insurance	100	100	100	100	100	100	100	100	100	100	100	100	1,200
25 Other Fixed Expenses	0	0	0	0	0	0	0	0	0	0	0	0	0
E. TOTAL FIXED EXPENSES	$7,667	$7,667	$7,667	$7,667	$7,667	$7,667	$7,667	$7,667	$7,667	$7,667	$7,667	$7,667	$92,004
F. TOTAL OPERATING EXPENSES	$23,667	$23,667	$23,667	$23,667	$23,667	$23,667	$23,667	$23,667	$23,667	$23,667	$23,667	$23,667	$284,004
G. NET OPERATING PROFIT (LOSS)	($23,667)	($23,667)	($23,667)	($23,667)	($23,667)	($23,667)	($23,667)	($23,667)	$16,333	$16,333	$56,333	$56,333	($44,004)
H. INCOME TAXES (estimate)													$0
I. NET PROFIT (LOSS) AFTER INCOME TAX													($44,004)

Appendix 3 – Pro Forma Cash Flow Forecast

SCHEDULE 3

Pro Forma Cash Flow Forecast for sWell
12 - Month Cash Flow Projections

Minimum Cash Balance Required = 5000

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	YEAR 1 TOTAL
Cash Flow From Operations (during month)													
1. Cash Sales	0	0	0	0	0	0	0	0	0	0	0	0	0
2. Payments for Credit Sales	0	0	0	0	0	0	0	0	0	80,000	80,000	160,000	320000
3. Investment Income	0	0	0	0	0	0	0	0	0	0	0	0	0
4. Other Cash Income	0	0	0	0	0	0	0	0	0	0	0	0	0
A. TOTAL CASH FLOW ON HAND	$0	$0	$0	$0	$0	$0	$0	$0	$0	$80,000	$80,000	$160,000	$320,000
Less Expenses Paid (during month)													
5. Inventory or New Material	-10,000	-50,000	-50,000	0	0	0	-25,000	-50,000	-50,000	-50,000	-50,000	-50,000	-385000
6. Owner's Salary	-4,000	-4,000	-4,000	-4,000	-4,000	-4,000	-4,000	-4,000	-4,000	-4,000	-4,000	-4,000	-48000
7. Employee's Wages and Salaries	-6,000	-6,000	-6,000	-6,000	-6,000	-6,000	-6,000	-6,000	-6,000	-6,000	-6,000	-6,000	-72000
8. Supplies and Postage	-100	-100	-100	-100	-100	-100	-100	-100	-100	-100	-100	-100	-1200
9. Advertising and Promotion	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-12000
10. Delivery Expense	-100	-500	-500	0	0	-500	-500	-500	-500	-1,000	-1,000	-1,000	-5100
11. Travel	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-12000
12. Legal and Accounting Fees	-3,000	-100	-100	-100	-100	-100	-100	-100	-100	-100	-100	-100	-4100
13. Vehicle Expense	0	0	0	0	0	0	0	0	0	0	0	0	0
14. Maintenance Expense	-300	-300	-300	-300	-300	-300	-300	-300	-300	-300	-300	-300	-3600
15. Rent	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-12000
16. Utilities	-350	-350	-350	-350	-350	-350	-350	-350	-350	-350	-350	-350	-4200
17. Telephone	-500	-500	-500	-500	-500	-500	-500	-500	-500	-500	-500	-500	-6000
18. Taxes and Licenses	0	0	0	-1,200	0	0	0	-1,200	0	0	0	-1,200	-3600
19. Interest Payments	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-200	-2400
20. Insurance	0	0	0	-400	0	0	0	-400	0	0	0	-400	-1200
21. Other Cash Expenses	0	0	0	0	0	0	0	0	0	0	0	0	0
B. TOTAL EXPENDITURES	($27,550)	($65,050)	($65,050)	($16,150)	($14,550)	($15,050)	($40,050)	($66,650)	($65,050)	($65,550)	($65,550)	($67,150)	($573,400)
Capital													
Purchase of Fixed Assets	-40,000	0	0	0	0	0	0	0	0	0	0	0	-40000
Sale of Fixed Assets	0	0	0	0	0	0	0	0	0	0	0	0	0
C. CHANGE IN CASH FROM PURCHASE OR SALE OF ASSETS	($40,000)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	($40,000)
Financing													
Payment of Principal of Loan	0	-919	-925	-930	-936	-942	-947	-953	-958	-964	-970	-976	-9520
Inflow of Cash From Bank Loan	150000	0	0	0	0	0	0	0	0	0	0	0	150000
Issuance of Equity Positions	175000	0	0	0	0	75000	0	0	0	0	0	0	250000
Repurchase of Outstanding Equity	0	0	0	0	0	0	0	0	0	0	0	0	0
D. CHANGE IN CASH FROM FINANCING	$325,000	($919)	($925)	($930)	($936)	$74,158	($947)	($953)	($958)	($964)	($970)	($976)	$390,680
E. INCREASE (DECREASE) IN CASH	$257,450	($65,969)	($65,975)	($16,980)	($15,386)	$59,108	($40,997)	($67,603)	($66,008)	$13,586	$13,580	$91,974	$97,280
F. CASH AT BEGINNING OF PERIOD	$10,000	$267,450	$201,581	$135,706	$118,726	$103,340	$162,448	$121,551	$54,048	($11,960)	$1,726	$15,306	$10,000
G. CASH AT END OF PERIOD	$267,450	$201,581	$135,706	$118,726	$103,340	$162,448	$121,551	$54,048	($11,960)	$1,726	$15,306	$107,280	$107,280
MEET MINIMUM CASH BALANCE	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE	FINANCE	FINANCE	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE

Appendix 4 – Pro Forma Balance Sheet

SCHEDULE 4 **Pro Forma Balance Sheet for sWell**

		Opening		End of Year 1
	ASSETS			
	Current Assets:			
1.	Cash	175,000	107,280	
2.	Accounts Receivable	0	240,000	
3.	Inventory	10,000	65,680	
4.	Other Current Assets	0	0	
A.	**TOTAL CURRENT ASSETS**	$185,000		$412,960
	Fixed Assets			
5.	Land and Buildings	0	0	
	less depreciation	0	0	0
6.	Furniture and Fixtures	15,000	15,000	
	less depreciation	15,000	750	14,250
7.	Equipment	40,000	40,000	
	less depreciation	40,000	2,000	38,000
8.	Trucks and Automobiles	0	0	
	less depreciation	0	0	0
9.	Other Fixed Assets	0	0	
	less depreciation	0	0	0
B.	**TOTAL FIXED ASSETS**	$55,000		$52,250
C.	**TOTAL ASSETS**	$240,000		$465,210
	LIABILITIES			
	Current Liabilities (due within 12 months)			
10.	Accounts Payable	10,000	65,210	
11.	Bank Loans / Other Loans	0	9,320	
12.	Taxes Owed		0	
D.	**TOTAL CURRENT LIABILITIES**	$10,000		$74,530
	Long-term Liabilities			
13.	Notes Payable (due after one year)	0	140,680	
14.	Other Long-term Liabilities	55,000	0	
E.	**TOTAL LONG-TERM LIABILITIES**	$55,000		$140,680
F.	**TOTAL LIABILITIES**	$65,000		$215,210
	NET WORTH (Capital)			
	SHARE CAPITAL			
	Common Shares	175,000		250,000
	Preferred Shares	0		0
	RETAINED EARNINGS	0		0
G.	**TOTAL NET WORTH**	$175,000		$250,000
H.	**TOTAL LIABILITIES AND NET WORTH**	$240,000 BALANCED		$465,210 BALANCED

Appendix 5 – Break-even Point for First Year

SCHEDULE 5	Break-even Point for First Year	
Operating Expenses		
Owner's Salary	48,000	
Employee's Wages	72,000	
Supplies and Postage	1,200	
Advert. and Promotion	12,000	
Delivery Expense	12,000	
Bad Debt Allowance	0	
Travel	12,000	
Professional Fees	7,200	
Vehicle Expense	0	
Maintenance Expense	3,600	
Other Variable Expenses	24,000	
Rent	12,000	
Utilities	4,200	
Telephone	6,000	
Taxes & Licenses	3,600	
Depreciation	51,348	
Interest	13,656	
Insurance	1,200	
Other Fixed Expenses	0	
TOTAL OPERATING EXPENSES	$284,004	
CONTRIBUTION MARGIN =	Gross Margin / Net Sales	50.00%
BREAKEVEN POINT ($Sales) =	Total Operating Expenses / Contribution Margin	
	$568,008.00	

References

Destination Winnipeg information (n.d.). Retrieved April 24th, 2007 from http://www.destinationwinnipeg.ca/work_db_wa.php

First Water Inc. company information (n.d.). Retrieved May 6th, 2007 from http://www.firstwaterinc.com

Government of Manitoba information (n.d.). Retrieved April 24th, 2007 from http://www.gov.mb.ca/iedm/invest/strategic/strat5.html

Hills, F. (2006, March 10). WorldWater & Power, NAI Global Working Together to Provide Solar Technology. Financial Wire, 1. Retrieved May 2nd, 2006, from Electronic Library database.

International Strategy for Disaster Reduction information (n.d.). Retrieved April 18th, 2007 from http://www.unisdr.org/disaster-statistics/occurrence-type-disas.htm

PWGCS information (n.d.). Retrieved April 18th, 2007 from http://www.pwgsc.gc.ca/text/buying-e.html

Schonfeld, E. (2006, February 16). Segway creator unveils his next act. CNN Money.com. Retrieved May 5th, 2006, from http://money.cnn.com/2006/02/16/technology/business2/futureboy0216/index.htm.

Solar Powered Water Treatment Machine Introduced into U.S. for Disaster Relief. (March 7, 2007). Retrieved May 2nd, 2007, from http://www.csrwire.com/News/7743.html.

References Cont.

Spectra Watermakers, Inc. company information (n.d.). Retrieved May 6th, 2007 from http://www.spectrawatermakers.com

Statistics Canada information (n.d.). Retrieved April 29th, 2007 from http://strategis.ic.gc.ca/cgi-bin/sc_mangb/contact/sbp/sbp_e.cgi?user_id=275003810&year=1997&area=0&business_type=all&units=percent&customize_report=no&sic_code=H4930&button_expense_items=Create+Report

Twibell, D. (2006, December 1). Blue Gold: Many experts predict that the world is on a verge of a significant water shortage. This could spell opportunity for investors with long-term horizons. Financial Planning, 1. Retrieved May 4th, 2006 from Electronic Library database.

Water and Wastewater Technologies. (March 2003). Retrieved from http://strategis.ic.gc.ca/epic/site/ea-ae.nsf/en/ea02178e.html

Williams, C. (2006, October 16). The Lure of Liquid Assets. Barron's, 34. Retrieved May 5th, 2006, from Electronic Library database.

WorldWater & Power company information (n.d.). Retrieved May 6th, 2007 from http://www.worldwater.com

sWell.

literature review & references

Ahmed, Khondkar Iftekhar, Up to the Waist in Mud: Earth-Based Architecture in Rural Bangladesh. University Press Limited: Dhaka, Bangladesh, 1994.

Alexander, Christopher, The Nature of Order: the Four Books. Center for Environmental Structure: Berkeley, United States of America, 2005.

Benyus, Janine, Biomimicry: Innovation Inspired by Nature. Harper Perennial, New York: United States of America, 1997.

Braungart, Michael and McDonough, William, Cradle to Cradle: Remaking the Way We Make Things. North Point Press: New York, United States of America, 2002.

Burger, J.W. and Prins, A, "Bank Erosion and Channel Processes in the Jamuna River." Riverbank Erosion, Flood and Population Displacement in Bangladesh. Eds. K. Maudood Elahi, K. Saleh Ahmed and M. Mafizuddin. Jahangirnagar University, Dhaka, Bangladesh, 1991.

Colligan, Victoria and Schoenfeldt, Beth, Ladies Who Launch. St. Martin's Press: New York, United States of America, 2007.

da Cunha, Dilip and Mathur, Anuradha, Mississippi Floods: Designing a Shifting Landscape. Yale University Press: Pennsylvania, United States of America, 2001.

de Villiers, Marq, Water: the Fate of our Most Precious Resource. Stoddart Publishing Company: Canada, 1999.

Gerber, Michael, The E-Myth Revisited. Harper Collins Publisher: New York, United States of America, 1995.

Haque, C. Emdad, Hazards in a Fickle Environment: Bangladesh. Kluwer Academic Publishers: Dordrecht, Netherlands, 1997.

Haque, M. Mokammel, "Relief in Full Swing." From Crisis to Development: Coping With Disasters in Bangladesh. Eds. Hameeda Hossain, Cole P. Dodge and F.H. Abed. University Press Limited: Dhaka, Bangladesh, 1992.

Kamibashiart.com: imagery of character El Diablo derived from thread doll art.

MacKenzie, Gordon, Orbiting the Giant Hairball. Penguin Books: New York, United States of America, 1998.

Orr, David, The Nature of Design: Ecology, Culture, and Human Intention. Oxford University Press: New York, United States of America, 2002.

Parnell, Rachel and Sara, Rachel, The Crit. Architectural Press: Oxford, United Kingdom, 2003.

Roberts, Gregory David, Shantaram. Scribe Publications: Australia, 2005.

Shah, R.B., "Ganges-Brahmaputra: The Outlook for the Twenty-first Century." Sustainable Development of the Ganges-Brahmaputra-Meghna Basins. Eds. Asit K. Biswas and Juha i. Uitto. United Nations University Press: Tokyo, Japan, 2001.

Sinclair, Cameron, Design Like You Give a Damn. Eds. Architecture for Humanity. Metropolis Books: New York, United States of America, 2006.

Tomato, THE TOMATO PROJECT: PROCESS & BAREBACK. Laurence King Publishing: London, United Kingdom, 1999.

Turner, Chirs, The Geography of Hope: A Tour for the World We Need. Random House Canada: Canada, 2007.

Willis, Delta, The Sand Dollar and the Slide Rule: Drawing Blueprints from Nature. Addison-Wesley Publishing Company: Massachusetts, United States of America, 1995.