



Kootenay Mountaineer

The KMC Newsletter May-June 2003 Issue 3 Next deadline: July 25th

HOW MUCH IS TOO MUCH WHEN IT COMES TO USE OF RECREATION AREAS?

Because recreation has environmental as well as experience components, there are some complexities that one cannot visualize in wildlife or range management. For example, our recreation areas provide a range of human experiences, some of which are not complementary. If I chose to hike in an area for a wilderness experience (quiet, solitude, few interactions with others), my opinion about that area's "carrying capacity" will be that it's very low. But if you choose to go mountain biking with a group of friends in the same area, your opinion of its carrying capacity might be quite different. From the perspective of experience, both of us are right.

Research has shown us that there is not a direct linear relationship between number of users and their impact on the land. For example it only takes a small number of misbehaving or uninformed users to create a significant amount of impact, but the impact curve tends to flatten out after that initial change has occurred. Maximum impact can quickly exceed the carrying capacity with devastating results. Instead of a focus of numbers of users, it's increasingly apparent that it is human behavior, the level of management applied, and unique environmental characteristics of each area that play a larger and more relevant role in managing impacts than do pure numbers. Even "carrying capacity" is becoming an inappropriate term to describe the occurrence. This has led us to think instead of "How Much is too Much?" to "How much change in the environment and our experience could occur before the area is depleted?" Management objectives – both environmental and social- should be developed and implemented for recreation lands with this approach in mind. Dave Butler (The Outdoor Report Vol. 15, #4, Spring 2003).



Picture from Karabiner, Fall 1975. Artist: Phyllis Margolin of Argentina..

We've mentioned sustainable development in a previous issue. Perception is a big part of its interpretation. One can be fairly sure perceptions are being formed when Time Magazine (Aug.26, 2002) devotes an entire issue to it. **But how do you interpret "sustainable development" and our "Kootenay experience"?** If you don't, here's what others have said:

SUSTAINABLE DEVELOPMENT? "I probably shouldn't say this, but there is always the risk of preparing a big report on the environment that no one will read. Not that many people don't care about the issues. But after years of listening to the debates, many of us are suffering from "environment fatigue". We get the picture (pollution bad, clean energy good), but are frustrated that no one seems able to do much to help. Well, my advice is to put aside your skepticism because there are reasons to be optimistic. New technologies, innovative, market based incentives and a growing mainstream acceptance of green concerns offers hope that real progress is within reach. Focusing on solutions, "sustainable development", how to keep growing and lifting living standards without exhausting the globe's natural resources might offer the best road for the environmental movement-depending on the policies we adopt" Adi-Ignatius (Executive Editor for Time Magazine)

SO WHY SHOULD WE BOTHER? How come, at a time when the environmental movement is stronger and richer than ever, our most pressing ecological problems just get worse? Of course, the issues are complicated and could take decades and trillions of dollars to resolve. But part of the problem is that it's easier to hurl venom at practices you don't like, than to find new ways to do business and create change. The dogma of traditional green activism -that business (and economic activity) is the enemy- has done little to save the planet. Despite a record flow of financial resources to environmental groups, the planet's most serious challenges, global warming, loss of biodiversity and marine depletion, remain as intractable as ever, making environmental groups vulnerable to charges that they have prospered while the earth has not. This is not to suggest that environmental groups have been ineffective, on the contrary, they have accomplished invaluable operations, but tactics need to be changed.

First of all it is the companies that create the technologies needed to save the environment. How do you turn corporations into partners in preservation? When conservation purity is the only acceptable option, the biggest polluters have no incentive to clean up their acts. The good news is that once an industry leader turns green, the others often follow, fearful that consumers will punish them if they don't.

Secondly, polluting technology from the 1950's is at bargain basement prices because they don't reflect the hidden costs of air pollution, deaths from lung diseases and millions of dollars wasted on health care bills and lost worker productivity. The situation is the same the world over. The price of goods and services rarely reflect environmental costs. A concerted effort to correct this basic flaw in the market could be a huge leap for environmental progress. But many environmental groups continue to oppose market-based environmental reforms and instead remain welded to the "mandate, regulate and litigate" model of the past. Thirdly, it's not all or nothing. It's better to negotiate for more effective safeguards and a greater humanitarian use of technology than to raise fuzzy math and scare tactics that help green groups raise money. Overplaying the hand, invites scathing critiques that debunk environmental claims. Even more dangerous is how doomsayers create a Chicken Little problem. We need to bury the notion that the biological world is going to collapse and we're going to be extinct. That's nonsense and it can make people feel the situation is hopeless. We can't have people asking and living "SO WHY SHOULD WE BOTHER?" Gus Speth, Dean of Yales, School of Forestry and Environmental Studies. (Condensed from Time)

"How did we come to see everything on the earth as a potential to our own ends? David Suzuki on "The Nature of Things"

The Corporate Takeover of Nature? What's wrong with Fee Demo? For the past 100 years, our nation's (U.S.A) public lands have been managed to maximize the commodity value that could be extracted from them. Today, a major shift in federal land management policy is being developed and implemented. Instead of extracting commodities from nature, nature itself is being converted into a commodity to be repackaged, marketed and sold in the form of value added recreation products. Conservative Congressmen, cash-strapped Forest Service and BLM land managers, and recreation industry leaders are working cooperatively to create an entirely new land management paradigm. Their efforts are being directed toward maximal "commercialization, privatization and motorization" of our natural heritage, our wild, public lands. These efforts are currently packaged as the Demonstration Recreation Fee, also known as "**Fee-Demo.**"

What's wrong with promoting Recreation over logging? Isn't that the solution to the devastation inflicted on our forests by years of overly intensive resource extraction? If what was meant by Recreation were a simple walk in the woods, or a reflective enjoyment of nature, then Recreation might indeed be the solution. However, the kind of Recreation now being promoted is very different. It is Industrialized, Commercialized, and heavily Motorized. It is NOT a panacea. It is not an environmentally acceptable alternative to logging. It is big business coming to our National Forests, promoting equipment-intensive play where nature is little more than a scenic backdrop and proving ground for the latest and priciest toy.

No single statement more clearly expresses the importance recreation will play in the future of the US Forest Service than the following quote by Chief of the Forest Service, Michael Dombeck; "Rarely is recreation and tourism on federal lands understood as a revenue generator. Instead it has been perceived as an amenity - something extra that we are privileged to enjoy. Fortunately, that's beginning to change."

Commercialization Means Big Bucks! To turn recreation into a profitable commodity, a "revenue generator," public lands managers must first develop definable "products" and then market those products to "customers" who are willing to pay for them. Traditional low impact uses of public lands, such as hiking, fishing, wildlife viewing, cross country skiing, and mountaineering are difficult to turn into high margin recreational products. Making recreation truly profitable will necessitate a major investment in construction of large numbers of resorts, marinas, ski areas, RV campgrounds, motor-cross centers and other attractions capable of significant revenue generation. The USFS and their private partners will cooperatively construct these new facilities. This, at least, is the intention of the American Recreation Coalition (ARC), the lobby group of the motorized recreation industry. ARC is an influential force in shaping federal public land policy in America today because ARC and its corporate sponsors can help the federal agencies overcome the unrelenting budget cuts being inflicted upon them. These budget cuts have been mandated by the very same Congressmen who are cheering on efforts to commercialize, privatize and motorize our public lands. The current Demonstration Recreation Fee Program (commonly called Fee-Demo) is ARC's first step in bringing "Industrial Strength Recreation" to public lands. Charging modest fees for the use of rustic campgrounds and for a few other developed facilities on public lands are well established traditions and are not opposed by the Sierra Club. With Fee-Demo, however, we are experiencing fees that for the first time are being imposed for basic access and for the simple enjoyment of our public lands!

ARC and its members-real estate and resort developers, motorized equipment manufacturers and user groups, public lands concessionaires, petroleum companies, theme park operators, hotel and motel associations and other commercial interests-have pushed since the 1970s to have Congress pass enabling recreation user fee legislation. In 1996, after years of trying, Fee-Demo was authorized-without Congressional debate-by the anti-environmentalist controlled 104th Congress. Then in Oct. 1998, at the specific request of ARC, Congress extended Fee-Demo until the year 2004 by attaching one

more anti-environmental rider to the Omnibus Appropriations Bill. Fee-demo exists primarily to accustom the public to the concept of "Pay-To-Play." Fee-Demo is not succeeding in generating revenues as its promoters claim. It has failed to produce 'supplemental' revenues in any but a few isolated instances. In fiscal year 1997, Fee-Demo grossed just \$18 million for the USFS, nationwide. Of this, fully 53% was spent on overhead, implementation and enforcement of the Fee-Demo program itself. Yet, Congress, spurred on by ARC, continues to cut budgets of federal agencies in a deliberate attempt to force these agencies to seek alternative funding. User-Fees, Access-Fees, Entry-Fees and private-public partnerships are the intended outcome of these budget cuts.

Fee-Demo is the Wedge to Commercialization. The Fee-Demo program is not just a benign effort to fund needed programs, but is the leading edge of the motorized recreation industry's attempts to transform public land recreation into commercial products. Of these, the most dangerous "product" is perhaps motorized recreation. Fee-Demo is widely supported by the motorized recreation community because the Pay-To-Play concept will assure their continued access to public lands. Motor-sports groups such as the American Motorcyclist Association, United Four Wheel Drive Association and the Personal Watercraft Industries Association support Fee-Demo, but not only because they are members of the ARC. These groups count on their users being able to buy access to public lands. In the future, federal agencies will find it increasingly difficult to say no to additional snowmobiling, ORVing, ATVing, dirt biking or riding of personal watercraft, because to do so would be to cut their own revenue source. Increased motorized recreation will increase demand for more places to use their recreational machines: additional roads and motorized trails. Allowing motorized recreation to become a revenue generation tool of federal land managers is perhaps the single largest threat facing our quiet trails, still lakes, open deserts and unprotected road less forest areas. Reliance on user fees and private funding would take away the independence of federal land managers, forcing them to promote more of the high-impact uses that provide most revenue-and at the same time, cause the most environmental degradation. It would sharply reduce their future ability to focus on crucial non-recreational restoration efforts-of watersheds and fish habitat, of damaged forests, and of endangered ecosystems. The Sierra Club's San Francisco Bay Chapter opposes the Recreation Fee Demonstration Program. The Sierra Club believes the solution is in convincing Congress to end the Fee-Demo program and to provide adequate levels of funding to the Forest Service, BLM and the U.S. Fish & Wildlife Service. With adequate funding, these agencies would not be thrown to the mercy of for-profit corporations or forced to up facilities into revenue generating attractions.

How You Can Help

- 1] Actively oppose all public lands access fee programs. Even if you feel such access fees would pay for much-needed services -- such as getting those rangers out there - consider that the precedent thus set may win the battle, but lose the war.
- 2] Tell your legislators that our public lands don't exist to provide business opportunities! We will no longer put up with paying for playing. Tell them no fee, keep it free. We already pay taxes.

This article was printed by the KMC with permission of Vicky Hoover, Chair, Sierra Club California/Nevada Regional Wilderness Committee vicky.hoover@sfsierra.sierraclub.org. It was excerpted from "The Corporate Takeover of Nature: What's Wrong With "Fee-Demo," published in Words of the Wild, Vol. I, No. 2 November 1998 Newsletter of the Sierra Club's California/Nevada Regional Wilderness Committee, by Vicky Hoover.

For more information contact: Scott Silver, Commercialization of the Wild Issues Coordinator, Oregon Chapter Sierra Club Executive Committee and Executive Director of Wild Wilderness Phone (541) 385-5261 or e-mail ssilver@wildwilderness.org
Visit the Wild Wilderness Web Site at www.wildwilderness.org

Water is one of the most amazing and important substances on earth. Its abundance is what makes our planet unique and gives it life. The United Nations has proclaimed **2003 the International Year of Fresh Water**. The goals are to help people learn about, appreciate and place personal value on the importance of fresh water in their cultural and ecological heritage. For more information visit www.wonderofwater.ca

NOTES FROM OTHER CLUBS

Carpooling? The Sierra Club emphasizes that "its leaders cannot take an active role in making arrangements for participants' transportation. It does not have insurance for carpooling arrangements and assumes no liability for them. The leader supplies directions to the trailhead, but carpooling, ride sharing or anything similar is strictly a private arrangement among the participants. Participants assume the risks associated with this travel". (<http://angeles.sierraclub.org/angeles/info/arequire.htm>)

Why do I need to sign a waiver and release? By their very nature all adventure and extreme activities have an element of danger. A waiver and release protects the company against claims arising from possible accidents in the mountain or while traveling and also from liability for the actions of participants and third parties. On the waiver you sign that you understand that adventure and mountaineering activities hold danger by their very nature and that the mountains are unpredictable areas. You also admit that you are participating in the activities voluntarily. The waivers are to be signed by all participants and their guardians and there will be no exceptions. Without the waiver you will not be allowed to attend. (Venture Club at www.geocities.com/ventureclubkids/FAQ.html)

CALLING FOR A RESCUE? *Accidents do happen in mountaineering. Calling for help at unofficial or not well known places can cause some confusion while the dispatcher tries to work out where to send the ambulance. As dispatchers are not necessarily familiar with every crag, trail, or cache, make sure you provide as much detail (including a nearby address, street or intersection) as possible. Anything "off-road" may require search & rescue or special equipment; so let them know exactly where the accident is and what is needed. A climber/paramedic notes that when you call for help, the call is usually routed through a centralized dispatch center, and then emergency services in the area are notified. Even local emergency service personnel may not know locations by name only, and may need a nearby address or street name to find you. Also, ambulances and their personnel generally only go as far as they can drive or walk easily. Access #33.*

There are three things that if a man does not know, he cannot live long in this world: what is too much for him, what is too little for him and what is just right for him. (Swahili Proverb)

How to take that perfect travel photo

By Rick Sammon

Landscape photographs capture Mother Nature's beauty in all its splendor - a beauty we can experience again and again when viewing and sharing our images. With the summer travel season here, many shutterbugs will be exploring the great outdoors in search of good landscape photographs. If you plan to be one of them, here are a few tips to help you land the perfect landscape picture.

- **Subject selection.** Some photographers get so overwhelmed with a landscape that they try to capture the entire scene with their cameras. In those cases, the essence of the scene - the main elements - get lost. When composing a landscape, think about which elements should be included, and which ones can be omitted, for maximum impact. Try not to cram everything into your viewfinder.

- **Foreground element.** Generally speaking, landscape pictures without a foreground element (rocks, trees, a fence, flowers, plants or even a person) look flat because the viewer has no reference point from which to view the scene. Include a foreground element and you convey to your viewer the same sense of depth you felt when you took the picture.

- **Time of day.** Landscape pictures taken in the early morning and late afternoon have warmer colors (deeper shades of red, orange and yellow) and are more pleasing to our eyes than are pictures taken around noon, when the light is cool (a bit blue). Also, early morning and late afternoon landscape pictures have long shadows (if the sun is shining) that add a sense of depth and dimension to pictures.

- **Lens choice.** Wide-angle lenses are a good choice for landscapes because they have a wide field of view and because they offer good depth-of-field. Telephoto lenses can be used, too. They are good for isolating elements in a landscape, say a barn in an open field.

- **Aperture selection.** We see landscapes in focus, from near to far. To get as much as possible in focus in a picture, select the smallest possible aperture, around f/11 or f/16.

- **ISO setting.** Some landscape photographers like to use a soft focus filter combined with a fast film/high ISO setting on a digital camera for a soft, grainy effect. But to get the sharpest possible picture with little grain (noise in a digital camera), select a slow film/low ISO setting (ISO 50 to 100).

- **Filters.** Two types of filters can enhance almost any landscape. A polarizing filter can darken a blue sky and reduce reflections on water and even foliage. A graduated filter (dark on the top and clear on the bottom or vice versa - depending on how you hold it) can reduce the contrast range between a bright sky and a dark landscape for an evenly exposed picture.

- **Tripod.** Small f-stops, required for maximum depth-of-field, often require slow shutter speeds - sometimes a second or longer when shooting early and late in the day. To reduce blur caused by camera shake, you need a tripod. But a tripod does something else. It slows you down and forces you to "stop and smell the roses." It forces you to really look at the scene and little details (like a pop top from a soda can or a cigarette butt) that can be distracting. It forces you to think.

Have fun this summer shooting landscapes. Sure, shoot the postcard shot. But also use your creativity. For example, use a slow shutter speed when it is windy to blur grass and leaves, which will add a sense of motion to your picture.

Rick Sammon is the author of 21 photography, nature and conservation books. Associated press The Province, June 30,2002

Executive Notes



The Constitutional proposals are still under review by the executive.

Membership: We still have quite a number of changes to the KMC membership list. Please check out the bottom of this page. It has been a real struggle to get all the membership/waiver forms duly completed, signed and dated. It took a lot of time and energy as well as correspondence [by regular mail and/or emails], and phone calls, and all of this is costing the club money! We also would like to remind you that the membership list is only as currently correct as you let us know of the changes in your own personal addresses, phone numbers, emails, etc... or errors! ☺

Library: Please let us know if you have the 1996 Canadian Alpine Journal: We would like to photocopy it (the ACC gave us their permission) as the KMC library does not

have this edition. Call Eliane or Steve at xxx-xxxx.

Additions to our library:

1. Topographical maps of B.C, in particular the Okanagan and Kootenays which have been donated by the Ministry of Forests. We will have them itemized for you in the next issue. Thank you Drew and Joan for this "snappy recovery".
2. Mountain Footsteps Hikes in the Kootenay of Southeastern British Columbia, by Janice Strong, 2001, *Rocky Mountain Books, Calgary* (New Edition),
3. Ridgewalks in the Canadian Rockies, by Mike Potter, 2001, *Luminous Compositions, Turner Valley, Alberta*

Newsletter: The "Defrost in the Alpine Awareness Program" which the KMC supports has been renamed "Melting Mountains". This month's newsletter mailing includes the "Melting Mountains" brochure. Melting Mountains explores the impacts of climate change on the alpine environment. The brochure is great for outdoor clubs, backcountry stores, nature groups, visitor's centers, and

guiding and earth science programs. If you'd like to help distribute this brochure, they can supply from 10 to 100 brochures or more. See info on the brochure.

With regard to the newsletter we sure appreciate your positive and encouraging comments! Please keep sending us your ideas, comments, input... trip reports and submissions. Mountain scene sketches would be appreciated. Remember, documentation of trips leaves a footprint for establishing future use of these areas.

Climbing camp: More information on this year's camp will be in the next newsletter.

Summer hiking trips: We still need a few volunteers to coordinate trips. Please call Don Harasym at xxx-xxxx or email at xxxx@xxxx.ca

Biking trips: The updated list is in this newsletter. Thank you to all volunteer coordinators. Some dates still need to be filled and if anyone can help, call Carol at xxx-xxxx or send an email at xxxx@xxxx.com

KMC Trip Reports

Sentinel Slog, April 2

One very hearty hiker arrived at the meeting spot in spite of the menacing skies that Wednesday morning and we cheerfully started our ascent on the southeast side of Mt. Sentinel. Twin flowers, spring beauties, glacier lilies, violets and buttercups greeted us along the way. We had some fine views of the Kootenay and Columbia rivers and sprawling Castlegar. An hour and a half later we reached the rocky outcrop that was our objective, found a dry spot under a douglas fir and ate our lunch at leisure, watching the falling snow and hail, and the fog enveloping us in a shrouding mist. Too bad, because the views from here are pretty good under blue skies!

So, we packed up and had a quick descent. Near the end, Dave noticed some sure bear signs: a good scratch on the muddy ground and dug up glacier lily bulbs (*). Well, spring is here and the critters are out. And we three had a great workout!

Our trio: David Cunningham, Eliane & Steven Miros.

(* *Dave saved those two unearthed bulbs, took them home to Joan who potted them and both discovered that one of the bulbs produced a flower which they identified as blue-eyed grass! (blue petals with a yellow stamen).*

Windy Ridge, April 6

Avalanche hazard dictated the change in plan from Qua Mtn. to Windy Ridge (Wolf Mtn. area). The trip going up was nice. Visions of lovely powder turns swirled in our heads. However, the rapid warming made coming down quite a different reality. Isothermic mush made the number of turns about the same as the number of falls for half of us. Lee (with fat skis, youth and skills acquired from growing up at the Whitewater Ski Hill) and Tucker (who has four legs) didn't fall as much. We got to the bottom alive, had a snack in the beautiful sunshine and pondered our immediate future in the truly Canadian fashion weighing the pros and cons of all available options. Anything south facing would be more of the same and the day was too far gone to try another north-side-somewhere-excursion. So the decision was made to climb back up and try to pick off shady spots in the big timber on the lower third of the slope. This proved to be ok. At least it resulted in an adequate calorie burn for the day and as everybody knows, there is no bad ski day... Some are just better than others. Lee, Leo, Morris, Tucker and I (Dwain).

Ahh Spring snow - "winter snow with a tan" one might almost say – that lovely consolidated stuff, which covers the mountainsides after the powder is gone and before the flowers (and bush) reappear. Spring snow! You can walk on it! You don't need skis or snowshoes, just step up the slope in the little pockets, the mini sun-cups whose edges are outlined with wind-scattered needles and pollen. Overhead not a cloud and the morning sun is gilding the beckoning mountain tops. The terrain becomes steeper, a gully perhaps, and you tie on the crampons, a gleam in your eye as you tiptoe to heaven, that line where the white meets the blue. On the summit you bask in the sun. No need to rush away. Might anyone guess, looking at the cap pulled over your eyes, that yours is no idle idleness? At last it is down time. Crampons stowed safely in day-pack and ice-axe in hand you step, nay leap with a yell onto the sun-softened snow. There are days when to live is to boot-ski: Steady, in balance, link turns, steer 'round a rock, jump a small moat and everything works, what a ride! You get off, one might say, on the gravity of the situation.

Words of Sandy Briggs (Alpine Club of Canada, Vancouver Island Section) from his article "DOWN TIME - GOOD TIME (In Praise of Glissading)" on the Federation of Mountain Clubs of British Columbia website.

Book Review



Waterfall Ice (4th edition) Climbs In The Canadian Rockies

by Joe Josephson, 2002
Rocky Mountain Books, Calgary

If you enjoy being cold, tired and scared, or just think that you might, then this is the book for you. Another outstanding volume from Rocky Mountain Books – almost 800 ice climbs from Jasper to Waterton are described, 300 more than in the 1994 edition. Hopefully new routes such as Valley of the Sun will direct some of the traffic away from overworked classics like This House Of Sky. They have such evocative names in The Ghost).

Included for the first time are areas near Fernie, and Cranbrook's Bull River Canyon. With so many routes to cover, descriptions are short but adequate. This book points the way, but doesn't hold your hand. Approximately 250 black and white photos show both routes and climbs in action. Check out the shot of Guy Lacelle free-soloing the Terminator. You can also learn how to make an Abalakob Sandwich – not as tasty as it sounds – but a big improvement over conduit.

I have a couple of minor criticism. First, in an area such as Haffner Creek and the Bull River, where multiple climbs are situated close together, it can be difficult to tell which is where, especially if they are not all fully formed. Diagrams for these places would be useful. Second, the index includes only the names of the climbs, and not the names of the drainages, which can be frustrating. An index of drainages and other access features is suggested. Unum Erratum – the photo on p.259 shows Lady Killer, not Pretty Nuts as listed.

Recommended trips for KMC members would be to start with some practice time on the short (25 m.) but steep Pillars in the Bow River at Cranbrook, and then progress to the 3 or 4 longer routes (150 m.) on Gibraltar Wall, near Canal Flats. Unfortunately the "secret" of Gibraltar is no longer, and climbers day-trip it from as far away as Calgary and Spokane, so get there early.

Of course it's not always about pain and suffering, just most of the time. While my own ice climbing forays (follies?) are now few and feeble, it is hard to beat the exhilaration of picks and front-points sinking into steep plastic ice, on a sunny south facing waterfall. Like most things, it's all in the timing!

Hamish Mutch

"Literacy is Freedom"

"If you continually view other people through your own eyes, you'll lose the opportunity to see the world through theirs." from Rolf Potts book VAGABONDING: AN UNCOMMON GUIDE TO THE ART OF LONG-TERM WORLD TRAVEL

"If we reached all the destinations, it would be the end of exploring, and that would be a terrible loss. We don't need to achieve all our virtual realities in order to keep our sense of wonder alive; we simply have to open our eyes and look around us." *Unknown*

“Water, water, everywhere, Nor any drop to drink.”

Samuel T. Coleridge could have just as easily been writing about today's wilderness traveler as the ancient mariner when he penned his famous poem in 1797. Water is vital to all of us, but safe potable water is not always readily accessible. We all know that water weighs a lot (1kg/l) and the last thing we want to do is add unnecessary weight to our packs. Unfortunately, dehydration is both subtle in its onset and serious in its consequences. If a person waits until they are thirsty to drink, they have waited too long. With dehydration come fatigue, muscle cramps and nausea. Performance goes down, but this is not the worst of it. Dehydration increases risk for heat stroke, and can eventually lead to collapse and even death. But how much water is enough and how can we make sure we can get it?

An active person will require approximately 2 ½ to 3 litres of water daily. Add some sunshine, hot weather, a reflective surface such as a rock face or glacier and 4 to 5 litres becomes the minimum daily requirement. Altitude adds a further dimension with the air being much drier the higher one ascends. Because of this, significant body water is lost with every breath taken. If counting litres is not your thing, you should be drinking enough that you need to pee several times during the day and your urine is copious and almost colourless. The one caution here is for those individuals involved in endurance activities (e.g. ironman triathlon, canyon walking) where cases of excessive fluid intake can produce dilution of the body's normal chemistry (hyponatremia) leading to complications as serious as those seen in dehydration. For those involved in prolonged physically demanding activities the range of 500 to 750 ml of fluid intake per hour has been suggested as more appropriate, and, if possible, in the form of sports drinks that include electrolytes (salts).

As stated earlier, getting your mouth around this much clean water is not always easy. Carrying several days' supply would be an almost prohibitive weight, and not your first choice unless there was no source along the way. If you are planning a multi-day excursion up a big wall, hauling water with you is indeed the only alternative and one you must not skimp on. Hiking up a mountain will often bring you into close proximity to streams, but although the water may look cool, clear and tempting, be aware that even in the Rocky Mountains many of the streams are contaminated with organisms that can cause serious illness.

Anyone who has experienced the cramping and diarrhea of “beaver fever” knows that, very quickly, a camping trip can be ruined, and that often recovery can be very slow and prolonged, with flare ups of symptoms even weeks later. Although cholera is a risk only in developing countries, E. Coli, salmonella and shigella are all bacteria that can also produce life threatening dysentery (fever and bloody diarrhea) and can be found in North American water sources. Infectious hepatitis, a disease caused by the hepatitis A virus, affects the liver producing jaundice as well as causing nausea, vomiting, fever and abdominal pain. This tiny virus particle is frequently spread by water.

At lower elevations a number of pathogens (disease causing organisms), including viruses (e.g. hepatitis A), bacteria (e.g. salmonella) and parasites (e.g. cryptosporidium), can readily be found, but even in upper regions giardia cysts, the source of beaver fever, can be shed into the water supply by animals carrying this parasite. The presence of animals and humans in an area will mean faecal contamination and high likelihood of infectious organisms seeding the water supply. Some people are comfortable with taking the risk of drinking unpurified water, based on their knowledge of the local water supply. To be absolutely certain, however, some form of water treatment is necessary to eliminate the possibility of water borne illness.

Water Treatment. General principles should be kept in mind when obtaining water for drinking, even if the plan is to proceed with a disinfection treatment. The lower the initial load of organisms and other contaminants, the more effective the treatment will be. Obtain clear, free running water upstream from any known contamination source, if taking from a stream, or well out from shore, with as little silt as possible if the source is lakewater. Snow should be collected uphill from the hut or campsite and well away and above any latrine facility. Avoid any snow nearby or underlying “pink snow”, a form of algae seen on glaciers. Similarly, care should be taken in disposal of waste to avoid contributing further to contamination of water supplies. Handwashing and good personal hygiene are also key in avoiding waterborne transmission of disease.

Disinfection Methods. Water can be made safe for drinking by one of three methods, heat, chemical treatment or mechanical filtration.

Heat is the oldest and the most consistently effective method of disinfecting water so that it is safe to drink. Although old recommendations were to boil water for ten minutes, this has been proven to be unnecessary and simply bringing it to a boil allows enough time at high temperature for pathogens to be destroyed. Either covering the pot after the boil and allowing slow cooling or boiling for a full minute provides a wide safety margin. Although altitude does lower the boiling temperature, the achievable heat is still enough, but again a longer boiling time, up to three minutes at high altitude, makes safety a certainty. There are drawbacks, however, to heat treatment, the main one being the need to carry fuel. Heating water also does not improve other physical characteristics, including appearance and taste, that may make water less palatable.

Chemical Treatment of water is the most commonly used method worldwide to render it safe to drink. Of the disinfectants, chlorine and iodine (halogens) are primarily used due to their high effectiveness, when used correctly, and low cost. It must be remembered that the ability for halogens to kill organisms depends on both their active concentration in water as well as the contact time. Colder water requires longer contact for disinfectants to work. Cloudy water, or water with much organic material in it, requires a higher dose of halogen as some of the chemical added will be absorbed or inactivated by the material in the water. In this situation it is best, if possible, to allow impurities to sediment out prior to using a halogen.

Bacteria are very sensitive to halogens, being inactivated within minutes at relatively low (2 parts per million) levels of chlorine or iodine. Viruses are more resistant, but still are effectively treated at commonly used concentrations (2 to 4 ppm) usually within 15 minutes. However, fairly high doses with prolonged contact time are required to destroy protozoal cysts. Although giardia is fairly sensitive in warm water, higher pH (low acidity) and lower temperatures indicate a need for longer contact time. Cryptosporidium is even more resistant, and so if this parasite is suspected chemical disinfection may not be practical.

Both chlorine and iodine are available in either liquid or solid forms. Iodine has some advantage over chlorine as it is less sensitive to pH and has minimal unpleasant taste at recommended concentrations. It should not, however, be used by pregnant women, those with iodine allergy or people with thyroid disease (such as goiter). As well, its safety with long term use has not been proven. Chlorine is the better choice for water which will be

stored for a prolonged time as it also inhibits the growth of algae. With either halogen, depending on the product, the potency may decrease with time or exposure to heat, moisture and air. Taste and appearance are not improved with chemical disinfections and may actually be more unpleasant if concentrations higher than 4 mg/L are used. Taste can be improved by the addition of flavouring, such as fruit flavoured crystals (e.g. Tang, Gatorade) but it must be remembered that the vitamin C that these crystals contain neutralizes the action of the halogen and therefore must not be added until sufficient time has passed for sterilization to have occurred. Finally, the liquid preparations of halogens are corrosive and stain if they leak from their container.

Chlorine is available as common household bleach in a 5% solution. Adding 0.1 ml (approx. 2 drops) to a litre of water will result in a 4-5ppm solution, the usual desired concentration for clear appearing water. This should be doubled for cloudy water, or if the aim includes treatment for giardia. Several commercial products are on the market in tablet form including Aquaclear, AquaCure, AquaPure and Chlor-floc, which includes a flocculating agent (see "Mechanical Methods") to help precipitate out impurities. These products are generally formulated to add one tab for every litre (8ppm) or two litres (4ppm) of water.

Iodine can be used as a 2% solution (tinture), requiring 0.2ml added to a litre of water for a 4ppm concentration. Another method for using iodine is by making a saturated solution of crystals either in water or alcohol (solvent). As the liquid is gently poured off the top and more solvent added, more crystals dissolve. The concentration is reliable only if crystals remain at the bottom of the container. Thirteen millilitres of the water solution or 0.1 ml of the alcohol solution should provide a 4ppm concentration in a litre of water. Finally, tablet formulations, e.g. Potable Aqua and globaline, are designed to provide a standardized concentration when directions are followed.

Mechanical Methods of cleansing water may involve sedimentation, with or without flocculation (chemically aided clumping of impurities), and/or filtration. Sedimentation works best for larger suspended particles that are clouding the water, such as silt. About an hour of leaving the water undisturbed is usually enough for material to settle to the bottom and allow for clearer water to be decanted (gently poured off the top). Although some pathogens, particularly cysts, may settle with solids, this is not enough for purification and some other form of treatment is required. Smaller particles and chemical complexes too small to see can be cleared by a method known since 2000 BC, called coagulation-flocculation. Lime or alum, about a pinch per litre, can be added then rapidly stirred in for one minute, to produce complete mixing. The dissolved or suspended material sticks to these substances (coagulation), and as gentle mixing continues, for another five minutes, these clump further (flocculation) producing a larger solid which can then sediment out or be removed by pouring through a cloth or paper filter. Further disinfection is still required, but this will significantly improve both appearance and taste of the water.

Filtration offers many advantages, including simplicity and the fact that it adds no unpleasant taste to the water being purified, but filters do add weight to a pack. They work by trapping pathogens on a membrane or in a maze of fibres. Particulate matter dissolved in even clear looking streams will eventually clog filters, sooner if the water is cloudy. This is somewhat improved with the addition of a prefilter, or sieve, and most ceramic filters can be scrubbed, although this will eventually break down the filter itself. The offending organisms are not killed by passing through the filter, and so any crack that allows even a tiny amount of water to run directly through will contaminate the outflow. Filters run a wide range, from simple fine pore membranes to reverse osmosis filters used not only to purify, but also desalinate water. For the wilderness traveler it is important to know the advantages and disadvantages of various features to decide which, if any, suit their purpose.

What comes out the other end of a filter is determined by the pore size. Filters with a pore size of 2 microns or less are very effective at removing both bacteria and spores or cysts, but viruses, being much tinier, can generally pass through this size. This is more of a concern in densely populated areas and third world countries, but can be solved by adding halogen to the water either before or after filtration. Filters which contain an iodine resin will also complete the purification process. These can be very effective, but are very slow in order to allow contact time, add weight and cost and have the same problems with cold and high pH as any halogen treatment. There is evidence that a newer technology called Structured Matrix¹, meets EPA standards for water purification without the addition of chemical disinfection. Granulated Activate Carbon (GAC) is another component often seen in filters. Alone it will remove many, but not all, bacteria, cysts and viral particles, and so is insufficient for complete purification. Its value is in its ability to remove dissolved chemicals (important in areas where pesticides may be used), including radioactive contamination, thus improving odour and taste. It will eliminate the unpleasant flavour left by halogens, but should be used only after the necessary time for purification by the halogen, as it also deactivates the chemical. Silver coating of the filter, another feature in some products, probably does not add much in effectiveness.

Other factors that come into play when making the filter choice include size, weight, mechanics of filtration (pump, squeeze bottle, gravity), speed of filtration and, of course cost. This information, along with the EPA rating, should be available for you to review before purchasing.

There are a number of other less commonly used methods for improving the quality of water, including UV light and filtering through columns of fine sand, but these are too numerous to cover in any detail and less relevant to the wilderness hiker or climber. *And so, if we come prepared, we do not find ourselves in the same predicament as the ancient mariner. It is up to the individual to decide how well they know the purity of the water source and if a day in the wilderness without treated water is worth the risk of weeks of diarrhea, or worse. In either case, drink water.* Ola Dunin-Bell

"My lips were wet, my throat was cold,
My garments all were dank;
Sure I had drunken in my dreams,
And still my body drank."

S.T. Coleridge, the Rime of the Ancient Mariner, Pt. II & Pt.V

¹ Gerba, C.P., Naranjo, J. E., Microbiological water purification without the use of chemical disinfection, Wilderness and Environmental Medicine: Vol.11, 1:12-16

This article by Ola Dunin-Bell was forwarded to the KMC for inclusion in the newsletter. Thank you.