

Planning for Backpack Cooking

Planning

There are many things that need to be taken into account before you take your trip. All of these will affect how you plan your food and nutrition for the backpacking trip.

Factors that need to be taken in to account

- Season / Weather – What will the climate be like for the majority of the trip?
 - Cold or Warm
 - Wet or Dry
- Terrain/Difficulty – What type of terrain will I encounter and how difficult will it be?
 - Mountain
 - Desert
 - Easy/Moderate
 - Difficult
- Resources – Will I have access to necessary resources?
 - Water easily accessible (Potable/Filtered)
 - Fire or no fire
 - Campsite or freeform (Rules/Regulations)
- Length of trip – How long will I be out?
 - 1-2 days
 - 3-5 days
 - 6+ days
- Demographics of group – What are the physical demographics of my group?
 - Age
 - Physical ability
 - Ability/Education
 - Allergies???
- Stove/Cooking device – How will I cook my food?
 - Stove Type
 - Cook or no cook
 - Type of Food

Now that I have addressed the questions above I can now realistically think about the Nutritional needs and plan the menu accordingly.

- Nutritional Needs –
 - How much?
 - Menu Planning / Type of Food
 - Purchasing / Repackaging
 - Simple or Complex
- Hydration
 - Persona – Daily Intake
 - Cooking

How many pounds of food should I take?

It is important to note that food types can weigh different. Dehydrated food weighs less which would mean carrying a lighter load. Also, at higher altitudes the caloric requirements per day increase.

- Rules of thumb (to maintain good health and energy)
 - Easy/Moderate Hike (Three Season Backpacking) – 1.5 to 2 lbs. food per day. 30 to 40% fat content
 - Strenuous conditions (Cold Weather Backpacking) – 2 to 2.5 lbs. food per day. 30 to 40% fat content
 - Very strenuous conditions (Winter Backpacking) – 2 to 2.5 lbs. food per day. 30 to 40% fat content
 - For a long duration hike (more than 3 days) boost fat to 35 to 40% by selecting high fat foods
- How many calories do I need?
 - Easy/Moderate Hike (Three Season Backpacking) - 2,500 to 3,000 per day
 - Strenuous conditions (Cold Weather Backpacking) - 3,500 to 4,000 per day
 - Very strenuous conditions (Winter Backpacking) - 4,500 to 6,000 per day
 - Load < 15% of body weight, gentle terrain needs not significantly different from normal – 2,500 to 3,500 calories for active female, 3,000 to 4,000 calories for active male
 - Load 25-35% of body weight, difficult terrain requires 500 to 1000 extra calories per day

Carbohydrate vs. Fat vs. Protein?

- These two are the preferred fuels for muscle. Ratio determined by energy demands
- Carbohydrates
 - Approximately 50% of your daily intake is carbohydrates. This should be pushed to around 70% for backpacking.
 - Starches and sugars provide quick energy and longer term fuel.
 - Best to use whole grains, raw sugar and other non-processed foods.
 - Simple carbohydrates (candy, trail snacks) process quickly for quick energy
 - Complex carbohydrates (pasta, grains) release energy more slowly
- Fat
 - Approximately 25% of your daily intake should be fat
 - During winter this should increase to around 40%
 - Fat takes longer to break down and are a better source of long term energy
- Protein
 - Eating excess protein stresses kidneys and is difficult to digest. Only 5-10% of diet should be protein.
 - Complete proteins (Meat, Fish, Eggs, Dairy) carry all the necessary 8 amino acids for good health
 - These are hard to use due to spoilage and weight
 - Incomplete Proteins (beans, peanuts, cereals, vegetables, fruits) – don't contain all 8 amino acids
 - How to get a complete Nutritional Protein (Dairy, Grain, Legumes, Seens)
 - Dairy and Grain
 - Grain an Legumes
 - Legumes and Seeds
 - GORP – Good old Raisins and Peanuts

Menu Planning

- When planning a menu you need to decide on a few key concepts. Each has pros and cons. Depending on what you choose you can target in on nutrition, weight, waste and creativity.

Group cooking

- o Pro
 - Less equipment to carry as it can be distributed among the group
 - Standardization of meals can help with costs and weight
 - Maximize nutritional factor so everyone gets what is needed
- o Con
 - Equipment failures can put stress on group cooking
 - Lack of choice/variability/Nutrition – Food is a comfort items!!!!
 - Not enough for changes in activity (Climate/Terrain) to compensate for increased physical output

Individual cooking

- o Pro
 - Customized to the individual
 - Equipment can be focused on food choice and cooking style
 - Nutritionals can be targeted for the individual and activity
- o Cons
 - Equipment failures leave little options
 - Limited variability in choices
 - Not enough for changes in activity (Climate/Terrain) to compensate for increased physical output

Meal by Meal

- o Pro
 - Each meal on each day is planned
 - Nutrition can be worked out per individual
- o Con
 - Food weight
 - Over planning

Ration System – This is when you bring a lot of different ingredients and create menus on the fly

- o Pro
 - Greater flexibility
- o Con
 - If not planned correctly and monitored – lack of food

Once you have decided on how you plan to cook you can then focus on the following concepts to help with planning the menu:

- Where are you going (Altitude/Temperature)?
 - o Depending on where you are going certain foods might be important to plan in to the menu to combat the circumstances you will encounter.
- How long are you going to be out?
 - o Depending on how long you will be gone can dictate how much and what type of food you bring
 - Can you carry frozen, precooked or fresh food for the first day that won't spoil
 - If it is a longer trip, weight will be an issue so moving to lighter food will help
- Ease of preparation
 - o A key process to think about is how long are you planning on cooking each meal.
 - o How will you be cooking the food (stove, open fire, no cook)
- Type of food
 - o Depending on how you want to cook will focus you on the type of menu and food you plan to execute
 - Water boil – Dehydrated
 - Small stove or open fire – prepackaged?
- Weight constraints
 - o Depending on the choices above, weight can become a deciding factor
- Packaging/Repackaging

- This is a great option when trying to include variability and nutrition
 - You can trim weight and combine ingredients ahead of time for a complete meal
 - Fruit and oatmeal
- Spoilage
 - How long can I carry the food without it spoiling
 - How do I package it to prevent spoilage (Water, heat)
- Eating on the trail
 - Can you supplement meals by planning small

Water Purification

Dipping your head into a cold mountain stream and taking a long refreshing drink is an experience that has basically vanished from the wilderness areas of America. With the increased use of the wilderness there has also been an increase in the amount of bacteriological contamination of backcountry water supplies. The U.S. Environmental Protection Agency reports that 90 percent of the world's water is contaminated in some way. There are a variety of microscopic organisms that can contaminate water supplies and cause potentially serious, even fatal, illnesses among wilderness travelers. The major danger in the backcountry from these infections is fluid loss due to diarrhea and vomiting, which can lead to hypovolemic shock and possibly death.

In order to drink the water, you should be prepared to treat it. There are numerous methods of water purification, described below in order of effectiveness. Remember, however, that infections can also be spread through poor personal hygiene, something that purifying your water won't prevent.

Biologically Contaminated vs. Toxic Water

Biologically contaminated water is water that contains microorganisms such as *Giardia* (a common microorganism that, if not killed, leads to intestinal disorders), bacteria, or viruses that can lead to infections. *Toxic* water sources contain chemical contamination from pesticide runoffs, mine tailings, and so on. Boiling, filtering, or chemically treating water can remove or kill microorganisms, but it will *not* remove chemical toxins. This is also the case when using a solar still.

Boiling

Boiling is the most certain way of killing all microorganisms. According to the Wilderness Medical Society, water temperatures above 160F (70C) kill all pathogens within 30 minutes and above 185F (85C) within a few minutes. So in the time it takes for the water to reach the boiling point (212F or 100C) from (160F or 70C), all pathogens will be killed, even at high altitude. To be extra safe, let the water boil rapidly for one minute, especially at higher altitudes since water boils at a lower temperature.

Chemical Purification

There are two types of chemical treatment: those using iodine and those using chlorine. There are a variety of products on the market, so follow the directions on the bottle. Be advised that many of the tablets have an expiration date and become ineffective after that point. Also, once the bottle has been opened, the tablets must be used within a certain period. When in doubt, buy a new bottle. Remember that chemical purification methods may only be partially effective, depending on the water temperature.

General Chemical Treatment Procedures

- The effectiveness of all chemical treatment of water is related to the temperature, pH level, and clarity of the water. Cloudy water often requires higher concentrations of chemical to disinfect.
- If the water is cloudy or filled with large particles, strain it, using a cloth, *before* treatment. Large particles, if swallowed, may be purified only "on the outside."
- Add the chemical to the water and swish it around to aid in dissolving. Splash some of the water with the chemical onto the lid and the threads of the water bottle so that all water areas are treated.

- The water should sit for *at least* 30 minutes after adding the chemical to allow purification to occur. If using tablets, let the water sit for 30 minutes *after* the tablet has dissolved.
- The colder the water, the less effective the chemical is as a purifying agent. Research has shown that at 50F (10C), only 90 percent of *Giardia* cysts were inactivated after 30 minutes of exposure. If the water temperature is below 40F (4C), double the treatment time before drinking. It is best if water is at least 60F (16C) before treating. You can place the water in the sun to warm it before treating.
- Chemically treated water can be made to taste better by pouring it back and forth between containers, after it has been adequately treated. Other methods include adding a pinch of salt per quart or adding flavorings (e.g., lemonade mix, etc.) after the chemical treatment period.

Iodine Treatment

Iodine is light sensitive and must always be stored in a dark bottle. It works best if the water is over 68F (21C). Iodine has been shown to be more effect than chlorine-based treatments in inactivating *Giardia* cysts. *Be aware that some people are allergic to iodine and cannot use it as a form of water purification.* Persons with thyroid problems or on lithium, women over fifty, and pregnant women should consult their physician prior to using iodine for purification. Also, some people who are allergic to shellfish are also allergic to iodine. If someone cannot use iodine, use either a chlorine-based product or a non-iodine-based filter, such as the PUR Hiker Microfilter, MSR WaterWorks, or the Katadyn Water Filter.

Generally, the procedure is as follows:

- **Liquid 2% Tincture of Iodine** Add 5 drops per quart when the water is clear. Add 10 drops per quart when the water is cloudy.
- **Polar Pure Iodine Crystals** Fill the Polar Pure bottle with water and shake. The solution will be ready for use in one hour. Add the number of capfuls (per quart of water treated) listed on the bottle, based on the temperature of the iodine solution. The particle trap prevents crystals from getting into the water being treated. It is important to note that you are using the iodine *solution* to treat the water, not the iodine crystals. *The concentration of iodine in a crystal is poisonous and can burn tissue or eyes.* Let the treated water stand for 30 minutes before drinking. In order to destroy *Giardia* cysts, the drinking water must be at least 68F (20C). The water can be warmed in the sun before treating or hot water can be added. Refill the treatment bottle after use so that the solution will be ready one hour later. Crystals in the bottle make enough solution to treat about 2,000 quarts. Discard the bottle when empty.
- **Potable Aqua** This is an iodine tablet product. Follow the manufacturer's instructions for use.

Chlorine Treatment

Chlorine can be used for persons with iodine allergies or restrictions. Remember that water temperature, sediment level, and contact time are all elements in killing microorganisms in the water. Halazone is an example of a chlorine tablet product. To use, follow the manufacturer's instructions.

Tricks of the Trail

- **Backups** Always have at least one backup method for water purification in case one fails. This can be any combination of methods. I'm the cautious type, so I always have two backup methods: water filter and 2% tincture of iodine or Polar Pure iodine crystals. And I can always boil the water. If boiling is your backup method, make sure you have enough fuel.
- **Fix the Taste** Adding vitamin C (about 50 milligrams) to iodized water completely eliminates any taste or color of iodine. You must wait until the iodine has purified the water before adding the vitamin C. The vitamin C in drink mixes like Tang™ has the same effect.

Filtration

There are a number of devices on the market that filter out microorganisms. A water filter pumps water through a microscopic filter that is rated for a certain-size organism. The standard size rating is the micron (the period at the end of this sentence is about 600 microns). Depending on the micron rating of the filter, smaller organisms (like viruses) can pass through. Be cautious when selecting a filter. You should know what potential organisms you need to treat for. You don't want to go to an area where a virus like hepatitis A is present in the water (a problem in some developing countries) with a filter that will handle only a larger organism like *Giardia*.

Common microorganisms and the filter size needed:

Organism	Examples	General Size	Filter Type	Particle Size Rating
Protozoa	<i>Giardia</i> , <i>Cryptosporidium</i>	5 microns or larger	Water filter	1.0–4.0 microns
Bacteria	<i>Cholera</i> , <i>E. coli</i> , <i>Salmonella</i>	0.2–0.5 microns	Microfilter	0.2–1.0 microns
Viruses	Hepatitis A, rotavirus, Norwalk virus	0.004 microns	Water purifier	to 0.004 microns

There are two basic types of filters (descriptions of several popular models begin on the facing page).

- **Membrane Filters** use thin sheets with precisely sized pores that prevent objects larger than the pore size from passing through. **Pro:** Relatively easy to clean. **Con:** Clog more quickly than depth filters. **Example:** PUR-Hiker.
- **Depth Filters** use thick porous materials such as carbon or ceramic to trap particles as water flows through the material. **Pro:** Can be partially cleaned by backwashing. Activated carbon filters also remove a range of organic chemicals and heavy metals. **Con:** Rough treatment can crack the filter, rendering it useless. **Examples:** MSR WaterWorks II, Katadyn.

Note: There is a difference between a water *filter* and a water *purifier*. Filters do not filter out viruses, but there are water purifiers, like the PUR Scout, that pass the water through both a filter and an iodine compound that kills any smaller organisms that have passed through the filter. These purifiers kill all microorganisms down to 0.004 microns; however, the filter **should not be used by people who are allergic to iodine**.

Common Practices for Using a Water Filter

- Filter the cleanest water you can find. Dirty water or water with large suspended particles will clog your filter more quickly.
- Pre-filter the water either through a pre-filter on the pump or strain it through a bandanna.
- If you must filter dirty water, let it stand overnight for particles to settle out.
-

Tricks of the Trail

Some water filters come as sealed cartridges, making it impossible to inspect the actual filter cartridge. If the filter takes a serious fall, it could crack internally. If the filter inside cracks, unfiltered water can flow through the crack. Treat your filter with care, and if it takes a significant impact, throw it away. Remember, any intake hose from a water filter has been submerged in unfiltered water. Treat this hose as "contaminated" and keep it in a separate plastic bag.

Comparing Water Treatment Options

In the sections below, we evaluate how various treatment methods perform point by point.

Effectiveness

Method	Protozoa	Bacteria	Viruses	Process
Boiling	✓	✓	✓	Water is boiled for at least 1 minute.
Filter	✓	✓	—	Water is strained through an internal element by pumping, gravity or sip/squeeze bottle.
Purifier	✓	✓	✓	Same as a filter but may include a chemical component.
Ultraviolet light	✓	✓	✓	Water is exposed to UV light; takes about 90 seconds per 32 fl. oz.
Chlorine dioxide	✓	✓	✓	Tablets are dissolved in water; requires 15 minute wait time.
Iodine	✓*	✓	✓	Tablets, crystals or tincture are dissolved in water; requires 15 minute wait time. (Important: not for pregnant women or people with a thyroid condition).

* Not effective against *Cryptosporidium*.

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Paperback: 448 pages

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Breakfast		
	Qty	Description
		2 Single serving of packaged oatmeal (multiple flavors)
		1 Granola bar/ Breakfast bar
		1 pkg freeze dried fruit (1 cup)
		1 Breakfast drink mix (16 oz mix)
		2 small box raisins

Lunch #1		1 Package of chicken salad meat
		0.5 Sleeve Ritz or Club Crackers
		2 Package Fruit snacks
OR		1 2 cnt package Pop tart (multiple flavors)
		1 drink mix 16 oz (individual serving packets)
		1 small ziplock of train mix (1 cup)
Lunch #2		1 Package Beef Jerkey
		1 Small Bagel
		1 Peanut butter cup
		2 Package Fruit snacks
		1 2 cnt package Pop tart (multiple flavors)
		1 drink mix 16 oz (individual serving packets)
		1 small ziplock of train mix (1 cup)

Dinner		0.5 Mountain house dehydrated meal
		1 small ziplock of train mix (1 cup)
		1 drink mix 16 oz (individual serving packets)

Optional		
Extra bag		
		1 Clif bar
		2 drink mix 16 oz (individual serving packets)
		1 small ziplock of train mix (1 cup)

Breakfast	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Lunch	Yes (on the road??)	Yes	Yes	Yes	Yes	Yes (on the road??)
Dinner	Yes	Yes	Yes	Yes	Yes	

	7:30am		Flag Ceremony	Flag Ceremony	Flag Ceremony	Flag Ceremony	Flag Ceremony
7:00am	8:00am		Breakfast	Breakfast	Breakfast	Breakfast	Breakfast
8:00am	9:00am		Leave Ridge Trail/Shakori Train Hike (app 2.5 miles) - LNT	Service Project - (Camping 9c)	Holten Mill trail Fishing	Hike of Fishing	Packup camp
9:00am	10:00am	Meet at SM house	Leave Ridge Trail/Shakori Train Hike (app 2.5 miles) - LNT	Service Project - (Camping 9c)	Holten Mill trail Fishing - LNT	Hike of Fishing	Clean camp - LNT - and leave to hike out
10:00am	11:00am	Depart for Camp	Leave Ridge Trail/Shakori Train Hike (app 2.5 miles) - LNT	Service Project - (Camping 9c)	Holten Mill trail Fishing	Hike of Fishing	Hike out
11:00am	12:00pm	Travel	Return to camp	Return to camp	Return to camp	Return to camp	Travel Home
12:00pm	1:00pm	Travel	Lunch	Lunch	Lunch and hike to Museum	Lunch	Travel Home
1:00pm	2:00pm	Travel	Free Time	Free Time	Museum Tour	Free Time	Travel Home
2:00pm	3:00pm	Hike into camp	Camping Merit Badge	Cooking MB	Camping MB	Finish any MB stuff - LNT	
3:00pm	4:00pm	Setup camp/Flag Pole	Wilderness Survival MB	Wilderness Survival MB	Wilderness Survival MB	Finish any MB stuff	
4:00pm	5:00pm	Setup camp	Cooking MB	Fishing Merit Badge	Cooking MB	Finish any MB stuff	
5:00pm	6:00pm	LNT Overview	Free time	Free time	Free time	Boat Race	
6:00pm	7:00pm	Dinner	Dinner	Dinner	Dinner	Special Dinner	
7:00pm	8:00pm	Flag Ceremony/Camping #1	Flag Ceremnoy/Free time	Flag Ceremnoy/Free time /LNT	Flag Ceremnoy/Free time	Special Dinner	
8:00pm	9:00pm	Camp fire	Camp fire	Camp fire	Camp fire	Camp fire	
9:00pm	10:00pm	Lights out	Lights out	Lights out	Lights out	Lights out	