



Watershed Connections

Model Instructions – Courtesy of the Interstate Commission on the Potomac River Basin & the Patuxent River Park

Example of a Completed Model Base



- Mountain Ranges
- Hilly Piedmont
- Flatter Coastal Plains
- Major River
- Chesapeake Bay



Above: Model with land-use pieces arranged to represent the watershed during the 1960s-80s.

READ FIRST

Read these instructions before buying your supplies. A [supply and tool list](#), including possible suppliers, is provided on ICPRB's website.

1. As seen in the top left photo, the finished model consists of three to four layers of materials. The base and second layer are cut from a 1-inch-wide 4-by-8-foot sheet of polystyrene insulation.
2. WHEN MAKING ONE MODEL, it is economical to buy one 1-inch-wide sheet of 4x8 ft. insulation. Note that some pieces will need to be cut down to .75- and .5-inches wide, per instructions written on the pattern pieces.
3. WHEN MAKING MANY MODELS, it can be time saving to purchase different widths of sheathing. They are available in the following widths: 1 inch, .75 in. and .5-in. To estimate how many pieces of insulation are needed:
 - Determine how many models you want. Print your [pattern pieces](#) on legal-size paper, so that you can measure the size of each piece. Estimate how many pieces will fit on each sheet of sheathing. This is where sketching and basic math are helpful.
 - Try to reduce the amount of Styrofoam waste, as you make this guesstimate.
4. TIP: To get the sheathing home from the store, we cut it in fourths (four 2x4 ft. pieces). The easiest way to cut: score the sheathing with a retractable blade knife and then break it along the score mark.

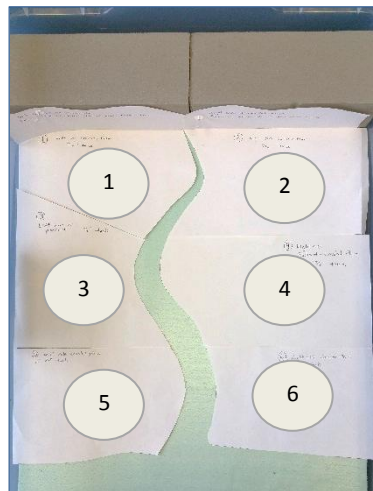


Above: Your primary cutting tool: a reciprocating saw blade with small teeth. Wind one end with duct tape for a handle. Retractable blade knives also work well.

Watershed Connections

Setting the Stage

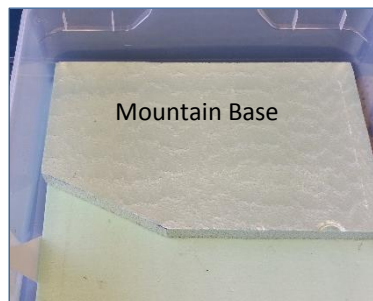
1. Cut the model base to 1x24 x15 inches and place it in your plastic bin. (If you have a different bin, you will might need to adjust the size of the model base.)
2. Complete the following steps to gain an understanding of how the Styrofoam pieces will be arranged.
 - Place two brown foam blocks at one end of your model base. They will be your highest mountain range.
 - Print your pattern on legal-size paper or card stock. Cut the pieces out and lay them on the base, as shown on the right. Make sure the stream “flows” from one pattern piece to the next.
 - If you want to alter the stream shape, for example, to make deeper bends in the stream or to widen its outlet, now is the best time to adjust the pattern. Take the pieces off the model base, and put them to the side.



See the directions on the pattern.

Cutting the Model Pieces

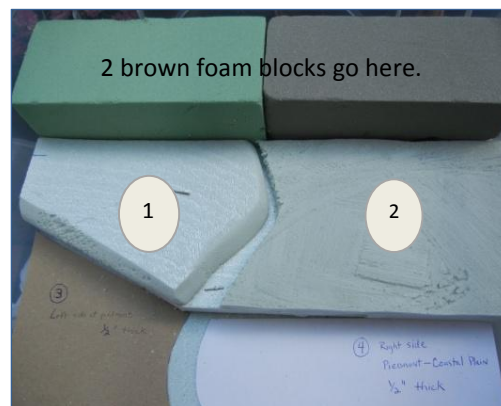
1. Read these steps and the directions on your Mountain Base pattern before proceeding.
 - Cut a 15.5 x 9.5 in. piece from your sheathing.
 - Align the pattern to the left lower edge of the piece you just cut. Using the “cut mark” on the pattern, draw a “cut mark” on it. Cut off this edge, so that it resembles the photo to the right.
 - T-pin the base in place. Gluing is one of the last steps.
2. Lay the rest of the pattern pieces on the sheathing and trace them.
 - Cut them out, using a reciprocating saw blade and/or utility knife. If you are using 1-inch sheathing, some pieces will need to be cut down to .5 and .75 inches wide, as per the pattern instructions. Use the reciprocating saw blade for this.
 - Write the pattern number on the back side (side with the writing).



To save time and involve other classes in this project, consider asking your shop class to cut the pieces on their equipment.

Building Up the Mountain

1. Position two *brown* blocks on the mountain base, *wide* sides up. (Some of our pictures show green and brown foam for the mountain base, simply because we used on-hand materials as we created the model.)
 - Put pieces #1 and #2 in place. There might be some overhang on the sides and front. The front overhang can be cut back later, if desired.
 - You can sand the “stream banks” on these pieces so that they slope towards the stream, but save fine-tuning for later.
 - T-pin all pieces in place for a temporary hold.



Watershed Connections

Stream Layout

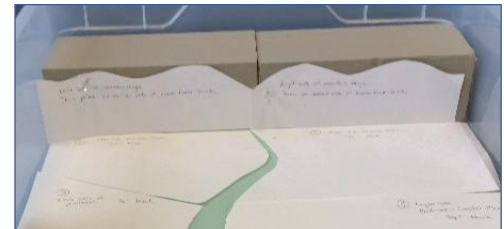
1. By now all of your pieces have been cut (even though the photo shows piece # 5 as uncut). Add pieces 3-6, aligning them so that the stream “flows” from one piece to the next.
 - If desired, you can still alter the shape or position of the pieces slightly to make ensure the stream outline is smooth or as wide as you’d like. This can be done through careful trimming and adjustment of their positions.
 - Once you are happy with the stream shape, sand its “banks” to soften the edges and emulate sloping on the inside banks.
 - T-pin each piece in place for a temporary hold.



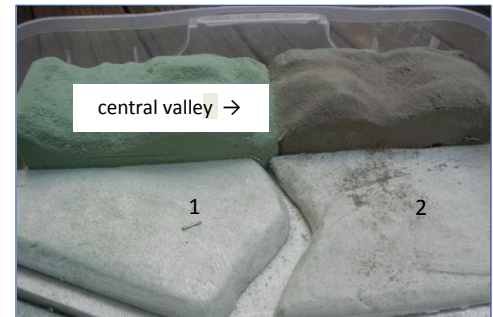
Pieces 3 and 5 overhang the base, because the bin bottom is narrower than its top. The small overhang is unlikely to break and prevents water from going down the side during use.

Shaping the Mountains With Stream Valleys

1. In this step you develop mountains and river valleys on your brown foam blocks.
 - Place the mountain patterns on the *narrow* side of each brown block. Make sure the middle dip – *your central mountain valley* – matches with the river formed by pieces 1 and 2. (Top photo: for this model, we moved the pattern to the left so the valley dip aligns with the river.)
 - Outline the mountains on the brown blocks.
 - Gently cut or shave the blocks in small sections so as not to break the foam. Slope the mountain towards the front of your model.
2. Now, imagine that small mountain tributaries flow into the central river.
 - Use your finger or a pencil to make depressions representing these tributaries (bottom photo). This will create rounded mountain tops and valleys.
 - Repeat this for each of the dips in your blocks.



The dips in the pattern represent river valleys.



The valley in this model could have been slightly better aligned with the stream, but when land-use pieces cover the model, everything will look great!

Building The Lower Mountain Ridge

1. It is time to create the next level of mountains. Cut a green block about in half.
2. If Piece #1 hangs over the edge of the mountain base you can:
 - Cut it back, as was done for this model; or
 - Leave it as is, which means making a piece on the next layer that will fit underneath it to give it support; or
 - Cut it evenly with the underlying base.



Watershed Connections

- The photo on the right provides an example of nicely shaped “mountain ranges.” To shape your next range, it is easiest to continue the paths of your rivers, making river valleys and rounded “mountain tops” as you proceed.
 - First draw the paths of rivers in the 3 different mountain valleys (the dips in the brown blocks). Do not draw a straight rivers. Remember rivers curve.
 - Use your finger, a pencil, or sandpaper to rub in the stream valleys. Make gentle curves and shapes, rather than angular ones.
 - Do not make the streams too deep, or the mountain ridges too small. Land-use pieces need to fit on top of these areas.



Option: If you prefer, you could create river valleys in between the “mountain ranges.”

Preparing the Piedmont

- Continue to use the green foam to create the lower, hilly piedmont, using the following tips.
 - You can make smooth transitions by using small pieces, as was done here, *but be careful. If you use many small pieces or very thin ones, your model will be less durable.*
 - Your “hills” need to be big enough to hold land-use pieces.
 - Rounding pieces to follow the shape of your rivers is effective.



Some rivers continue into the piedmont to give it hills. Streams also can start in the piedmont.

Fine Tuning, Gluing, and Finishing!

- Each piece needs to fit evenly on the piece below it. If a piece has gaps underneath it, correct this by sanding or adding small pieces of foam. Glue can be added in small cracks between pieces to prevent water from seeping between them.
- All the pieces can now be glued on with a glue gun. Following is the easiest way to do this.
 - Remove all the pieces, keeping them in order.
 - Glue, starting with the Mountain Base, then adding the mountain pieces, and then pieces 1-6.
 - Use plenty of glue. Feel free to add t-pins for extra stability.
- If needed, add more shape to your mountains by emphasizing the streams. However, do not make the streams so deep that they make it hard to attach land-use pieces on these areas.
- In the adjacent photos the rivers and tributaries on the sheathing were etched with a soldering gun.
 - Draw where you want tributaries and the Bay.
 - Use soldering gun to draw/melt in the tributaries and river.
 - The Chesapeake Bay can be cut out with the reciprocating saw blade or a soldering gun.



Two models show the different ways land forms and tributaries can be shaped and that streams can be detailed or added with the soldering gun.

Celebrate! Your class has a new, long-lasting watershed model!

Watershed Connections



The Watershed Connections Land-Use Model and teacher workshops were initiated through a partnership between the Patuxent River Park and the Interstate Commission on the Potomac River Basin.

Questions on building your model?

Or do you want to arrange a workshop at your school? Contact:

Rebecca Wolf, Watershed Coordinator

bwolf@icprb.org

301-274-8110

Interstate Commission on the Potomac River Basin

30 W. Gude Drive, Suite 450

Rockville, MD 20850