



Montana Mathematical
Modeling Challenge
2015

Question 1: Long-Term Living Space Needed

The conflict in Syria has displaced half its population from their homes.¹ Millions are living in refugee camps in Syria, while hundreds of thousands of others have flooded the borders of other nations. Coupled with refugees from other countries in unrest, this situation has been termed a global refugee crisis.

In May, the EU, a collaborative of 28 European countries, considered a proposal for distribution of 40,000 refugees among Member Nations. With migration rates increasing at an astronomical pace, another proposal was passed this past month that has EU nations absorbing another 120,000 refugees. However, this plan was not agreed upon unanimously² (as typical for measures of this type in the European Council). As a result there is significant political tension among EU nations over this situation, with some claiming they are already stretched “far beyond [their] capabilities,” and cannot take their proposed portion of the 160,000 refugees and others noting that current plan is not sufficient as it does not address the full enormity of the situation as it is estimated that up to 1.3 million individuals will seek asylum in EU countries by the end of the year.

Because the situation is amplifying by the hour, your team has been hired on an emergency status by the EU to create an alternative plan for distributing 160,000 refugees – or more – across the 28 EU nations. Your plan could be a modification of the current plan³ or something original, but it must address

1. the current situation.
2. future projections regarding the numbers of asylum seekers.
3. equity issues. Share why your plan is “fair” and stands a good chance of winning the support of all the members of the EU.

¹ <http://www.cnn.com/2015/09/11/world/syria-refugee-crisis-when-war-displaces-half-a-country/>

² <http://www.nytimes.com/2015/09/23/world/europe/european-union-ministers-migrants-refugees.html? r=0>

³ [http://europa.eu/rapid/press-release MEMO-15-5597 en.htm](http://europa.eu/rapid/press-release_MEMO-15-5597_en.htm)



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Question 2: Six Degrees of Seaweed?

On July 14, 2015, researchers at Oregon State University patented perhaps the most important agricultural innovation of all time. Seaweed. That tastes like bacon. More specifically, the OSU researchers have developed a fast growing strain of red marine algae, called dulse, which grows very quickly and has high protein content and nutritional value. And it tastes like bacon!

As global sea levels rise and regional droughts become more severe, many people are searching for alternatives to conventional agriculture. The cultivation of dulse is one such alternative. Your task is to create a mathematical model for the environmental impacts of large scale cultivation of dulse off of the American coasts. In particular, your model should address:

1. the amount of dulse which can be sustainably farmed,
2. the potential short-term environmental impacts, and
3. how quickly dulse will be adopted by the American public in lieu of pork bacon, and how the rate of adoption may affect the environmental impacts long-term.

Choose one question to answer. Please note that your team needs to send a (no more than) two page summary, including graphics, to twendt@carroll.edu by 9:00 am on Sunday and a presentation document (e.g., PowerPoint slides) to the same address by 10:00 am on Sunday.

Please keep in mind the following:

- Your summary and your presentation should be pitched to an audience in a leadership position who will need to make decisions based on the information you provide.
- Present your supporting mathematics in a way that is meaningful and accessible to your audience.